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licenses is simply to issue new licenses to all those currently holding commercial diving permits. These people are then said to be "grandfathered" into the industry. From that point forward a decision can be made as to how much reduction in license holders is necessary and desirable; the reduction can be accomplished by normal attrition or by establishing criteria for license renewals.

1D) Point System -- The state of Alaska has a program of limiting the number of licenses it grants for salmon fishing. At the heart of the program is a procedure for allocating "points" to applicants based upon their previous participation in salmon fishing and the extent of their economic dependence upon salmon fishing (see Appendix E). Other criteria could be adopted, but any criterion will be subject to problems of operationalization. It is also clear that only a very careful and judicious weighing of reliable information about each individual applicant against the chosen criteria will produce an equitable outcome. There is no inherent reason why a point system could not be used in the abalone industry, but as in Alaska it would probably become quite controversial.

2) Apprenticeship -- In any occupation or profession apprenticeship programs may be used to limit and control the influx of new members into a labor force. Apprenticeships are designed to allow a specified number of newcomers to learn the trade and the rules of the game. An abalone apprenticeship program could limit the number of new divers by permitting only a predetermined number of new apprentices and by requiring passage of an examination before successful completion of the program. Additionally, the very existence of an apprenticeship program may have an inhibiting effect by discouraging some potential new divers. Apprenticeship programs, in

different forms, could be operated for sport as well as commercial divers.

3) Taxes and fees -- Monetary disincentives can be used in two ways to limit entry into the fishery. First, the cost of obtaining a license (the license itself and the "cost" of apprenticeship and training) can be set in such a way that many individuals become unwilling or unable to obtain a license. Second, to the extent a tax is placed on abalone landings and that tax can't be shifted by the diver to others then such a tax might discourage some from continuing commercial diving. In the recreational sector, taxes/license costs could be imposed at a level which would limit the number of sport divers who take abalone.

4) Leasing -- A variation on some of the above techniques of limiting entry calls for the leasing of specific, identifiable areas to individual divers for their exclusive use. Depending upon the way in which leased areas were delineated this might be a method to limit entry. The award of leases could remain fixed at a number that does not allow for any expansion in the number of license holders or calls for an actual reduction in number. Although leasing as a management option can be used to limit entry, it is also a way of controlling access to the resource.

Controlled Access

The second major management approach involves the control of access to the resource itself. Controlling access entails regulations which either prohibit or in some way direct and control where, when, and how abalone may be taken for either commercial or sport purposes or both. Contrary to limited-entry approaches, there is a long tradition of controlling access to fishing stocks in California and the nation. Most of these efforts have been relatively simple and usually related to a safety concern (i.e., not

taking certain species because of health problems) or a biological requirement of the species such as having a closed season during spawning periods. In an era when some species are being threatened with depletion, a stricter control over access has potential merits.

Following is a brief summary of the more common techniques used to control access and the way they have been or could be applied to abalone. For the most part they are self-explanatory, so detailed descriptions are omitted.

1) Quotas -- Current law places a limit on the number of abalones (of any type) a sport diver may take per day and a limit on the daily number of black abalones a commercial diver may take. As a control device these quotas could become more limiting. Daily catch limits could be extended to other species; or, rather than placing a daily limit on divers, a monthly or seasonal limit could be established for individual divers or for the entire aggregate of divers.

2) Size limits -- There are clearly established legal minimum sizes for abalone. For certain species these sizes differ for sport and commercial divers. The larger the minimum legal size the fewer abalone that will be taken.

3) Seasons and hours -- Adjusting the months during the year and hours during the day that abalone may be taken is another way to control access to the resource itself. Current rules prohibit taking abalone prior to one-half hour before sunrise or any time after one-half hour past sunset. Abalone may be taken every month except during February and August.

4) Gear -- By dictating the type of gear a diver may use it is possible to control his ability to reach the resource. Sport divers are currently prohibited from using scuba gear in certain areas, thus limiting their access

to only the very shallow waters. The prohibition on scuba gear also limits the number of sport divers because free diving is a much more rigorous sport than diving with scuba. All divers must use a bar of certain dimensions for prying loose the abalone. However, gear restrictions for abalone diving probably do not offer very much opportunity to seriously affect the resource.

5) Area -- Controlling access to certain areas is a technique that is now used and in principle could be extended if so desired. Commercial divers, for example, may not take abalone in less than 20 feet of water (with some exceptions around the Channel Islands). Black abalones may only be taken in certain specified areas. From the commercial diver's perspective, a very drastic current area-based regulation is the one which prohibits the taking of abalone for commercial purposes from Pt. Lobos to the Oregon border. This absolute closure of an area could be extended or modified. One such modification would be a system of rotating closed and open areas on a periodic basis related to resource availability. It would be possible to do this all along the coast or in selected sections of the coast.

Resource Augmentation

If a resource is being depleted or if the demand for it exceeds the available supply--and both conditions seem relevant to abalone--then an obvious avenue for exploration becomes resource augmentation. It is not technically or ecologically feasible to "artificially" increase the supply of all fish species. However, there are individuals and companies who are actively involved in abalone mariculture. Large-scale mariculture efforts with abalone are simply too new to offer a definitive conclusion about feasibility, but several promising efforts are currently underway.

The state of California is modestly involved in resource augmentation efforts. The Department of Fish and Game is conducting some experimental work to determine the feasibility of abalone resource augmentation. In addition to supporting some university research on the subject, the Department operates a lab for its own experimentation. Recently, the Department planted some very small abalones off the Orange County Coast in an artificially created habitat. This effort was supported by \$5,000 appropriated by the Orange County Board of Supervisors. It will be a few years before the results of this and similar test plantings will be available.

The state has also cooperated with several mariculture ventures. For instance, California Marine Associates and Atlantic Richfield Oil Co. have recently begun an experiment to test the viability of growing abalone in special cages suspended below an oil platform in the Santa Barbara Channel. The California Fish and Game Commission, State Lands Commission, and the Coastline Conservation Commission all approved the necessary permits allowing this mariculture project to proceed. Project sponsors claim that within four years they will be producing 250,000 marketable abalone per year.

Complexity of Interaction Patterns

Having presented above both the criteria for evaluation and the management options, this concluding section will discuss some of the interactions within the criteria and within the options. Some attention will also be given to interaction between the criteria and the options. One fact will stand out -- the schema guiding this research and laid out in Chart 2.1 leads to very complex patterns of interaction for which thorough data are unavailable.

Criteria

The criteria of evaluation do not act in isolation, but instead are often

heavily dependent upon each other. The best example of this dependence in abalone management involves the criterion of legal feasibility. Notwithstanding a state constitutional provision protecting the right to fish, it is legally possible to place restrictions upon citizens who seek to take the state's fishery resources. Any such restriction, however, must be related to the resource itself and not be justified by reference to another public policy goal such as full employment or the well-being of a particular group of people. Therefore, any governmental regulation of abalone must ultimately rest its legal feasibility upon the finding of a biologically based rationale that preserves or enhances the resource.

Another illustration of the interaction of criteria occurs if political feasibility is considered. What is politically feasible is in great measure conditioned by legal constraints, economic consequences of a regulation or law, and the practicality of administering the policy. It makes no sense (from a political viewpoint) to propose a new policy that will have such adverse economic consequences for some people that necessary legislation could not be passed. The history of some recent legislation (AB 2880) dealing with abalone points the way certain divers and processors were able to secure legislative alteration of proposed regulations because the legislation would have increased their costs.

The criterion of biological effectiveness is also affected by political feasibility. How do we know what is biologically effective? Obviously, careful research is required, but there are opportunity costs and monetary costs associated with any research endeavor. Given limited resources, the Department of Fish and Game must set research priorities, and that means low priority items might not get funded. One decision rule that might guide the

Department in setting research priorities is the likelihood of successful legislation to deal with the research results. Sometimes the very act of undertaking research on a subject can create a political controversy. In either case, politics can influence research priority decisions and therefore politics interacts with the accumulation of biological information. An apparent example of this interaction comes from the controversy over the continued prohibition of commercial abalone activities along the coast north of Pt. Lobos. The commercial closure is predicated upon the belief that commercial activities would harm the available abalone stocks, but there is some disagreement about the condition of the resource in this vast area. Complete, definitive assessment of the abalone resource along this coastline is not available and the Department chooses not to invest in the expensive research required for such an assessment. Some would argue that the "unwillingness" to conduct the biological research stems from the Department's desire to avoid a reopening of the very emotional and political controversy over this closure.

Management Options

These examples of interaction within the criteria of evaluation can be amplified by examples of similar interaction within the management option category. The point to be emphasized here is that the three management options are not mutually exclusive and, in fact, aspects of all three options either are currently being practiced with respect to abalone, or are about to be implemented. At the same time that the number of commercial divers is being restricted to a fixed number (limited entry), there are also rules which govern the season, area, hours, size, gear, and type of abalone which may be taken (controlled access) and there are instances of state cooperation with resource augmentation efforts.

It is possible to use the management options in concert or separately. Access to the resource could be severely controlled, but no restrictions imposed on the number of divers allowed to take the resource. Or it would be theoretically possible to drastically curtail the number of commercial license holders, but reduce or eliminate the controls on access. The guiding principles in choosing which management options to stress are those criteria of evaluation which key decision makers find the most persuasive.

Criteria and Management Options

Understanding the way management options are affected by the criteria of evaluation is a prime objective of this research. Data which speak to these relationships will be presented in subsequent chapters, but some examples of possible interaction are appropriate at this point.

Attempts at resource augmentation clearly involve biological considerations -- can the abalone be grown under controlled ocean conditions and if so, then what is the best method? But any large-scale mariculture requires careful assessment of potential legal problems as well. Those who place the abalone on ocean bottoms must be able to prove legally that they introduced the abalone if they wish to retain exclusive right to harvest the resource. The need for legal proof of ownership obviously affects the way in which the management option of resource augmentation is approached.

Although it may be justified as a legally valid approach, many would take the position that sound public policy requires a careful assessment of the economic costs and consequences which might accompany resource augmentation. As we have seen in Chapter One, many divers do not make very large incomes from diving. A successful mariculture project, such as the California Marine Associates - Atlantic Richfield Oil venture mentioned earlier, might have a

profound impact in a downward fashion on the wholesale price of abalone if this one mariculture project can produce the number of abalone the sponsors predict. In other words, resource augmentation may raise equity questions -- e.g., should the state be cooperating with a mariculture program which if it is successful may create economic problems for independent divers?

Most of the rules which control access to the resource require careful enforcement for full effectiveness. The administrative consequences of access regulations must not be overlooked. If adequate enforcement of a regulation prohibiting the taking or possession of abalone in certain areas can be accomplished only with the addition of more law enforcement personnel and more or different boats, then the prospect of these added costs to the Department of Fish and Game might affect the actual adoption of the rules. Likewise, certain experimental programs of the Department which control access to the resource must be periodically evaluated to assess the validity of the programs' original assumptions. The internal administrative realignments necessary to make such evaluations, and their attendant costs, must be considered at the time an access rule is adopted. Clearly, controlling access may have significant administrative consequences.

As a final example of the way management options must be assessed with reference to the criteria shown in Chart 2.1, it should be emphasized that any attempt to limit entry will have consequences for all five criteria. For illustrative purposes, consider the potential consequences of a license limitation program. The political and legal feasibility of such a proposal will determine the program's specific details if, in fact, it can be adopted at all. Because a license limitation must be related to resource conditions and requirements, the biological data must be initially collected and analyzed

and some follow-up will be crucial in order to assess the resource consequences of the program. From a purely legal viewpoint the state may not be able to consider the economic viability of the industry or the economic or social impact on individuals as its rationale for a license limitation program, but as a practical matter these considerations are injected into projections of political and administrative feasibility.

Conclusion

This chapter has articulated the framework guiding the current research. Subsequent chapters will offer data and analysis which address most of the concepts and relationships presented herein.

Chart 2.2 attempts to summarize which data categories should be developed when considering a management plan. For example, what do we need to know about administrative feasibility? We need an understanding of the changes in internal organization, inter-organizational relations and enforcement practices brought about by a new management plan. While the data needs summarized in Chart 2.2 are probably not exhaustive, the chart represents an approach that, in our opinion, will not usually impose an undue analytic burden on those involved in the policy-making process.

One concluding point should be emphasized. A fishery management plan results from a series of choices in which trade-offs are made. Policy makers should make these choices as deliberately as possible, after careful evaluation of the criteria discussed in this chapter. Such an approach may help clarify the nature of the trade-offs and intended consequences of the plan; if unintended consequences can be minimized then so much the better. Data for this kind of effort may not always be available or complete, but the effort must be made.

Chart 2.2

Summary of Data Needs for Each Criterion of Evaluation

Economic and Social Consequences	Biological Effectiveness	Political Feasibility	Administrative Feasibility	Legal Feasibility
Composition, structure & profitability of industry; Level and sources of demand for commercial product; Identity and nature of non-commercial interests Prospective impact of plan (amount and distribution of benefits and costs) on: 1. Participants in Fishery 2. Broader Public Interests	Characteristics of Resource Ecology in Which Resource is Located Resource Augmentation Possibilities	Affected Groups Who Role Perceptions Key Political Actors: Who Influence Preference Prospects for Conflict Resolution	Administrative costs of: Internal organizational Changes Interorganizational Relations Enforcement	Statutes Constitutional Provisions Federal - Due Process Equal Protection State - Right to Fish

Footnotes to Chapter 2

- 1 Article I, Section 25 of the California Constitution reads:

The people shall have the right to fish upon and from the public lands of the State and in the waters thereof, excepting upon lands set aside for fish hatcheries, and no land owned by the State shall ever be sold or transferred without reserving in the people the absolute right to fish thereupon; and no law shall ever be passed making it a crime for the people to enter upon the public lands within this State for the purpose of fishing in any water containing fish that have been planted therein by the State: provided, that the Legislature may by statute, provide for the season when and the conditions under which the different species of fish may be taken.

- 2 California Fish and Game Code, Section 8306.9, effective January 1, 1977.

- 3 A few of the sources that have been consulted for information on fishery management plans include:

F. T. Christy, Jr., "Alternative Arrangements for Marine Fisheries: An Overview," in J. Carl Mundt, ed., Limited Entry Into Commercial Fisheries, Proceedings of the Conference Held at Lake Wilderness Continuing Education Center, Seattle, Washington, September 12-13, 1974 (Seattle: Institute for Marine Studies, University of Washington, 1974), pp. 29-40;

J. A. Crutchfield, ed., The Fisheries: Problems in Resource Management (Seattle: University of Washington, 1965);

J. A. Gulland, The Management of Marine Fisheries (Bristol: Sciencetechnica, 1974).

- 4 For a good discussion of these issues and relevant court decisions, see H. Gary Knight and James P. Lambert, Legal Aspects of Limited Entry for Commercial Marine Fisheries (New Orleans: Louisiana State University Office of Sea Grant, 1975).

Chapter 3

ATTITUDES TOWARD THE ABALONE FISHERY AND ITS MANAGEMENTIntroduction

Evaluations of alternative methods of managing any fishery should take into account the interests and preferences of all fishery sectors and, ideally, those of the general public. This is so not only for reasons of political and administrative feasibility, (i.e., if a segment of a fishery is adamantly opposed to some policy proposal, its adoption and enforcement will -- at a minimum -- be difficult), but also for purposes of assessing the potential socio-economic impact of alternative management methods. Well-intentioned methods such as limited entry in certain fisheries could well result in a variety of unintended disruptive consequences: economically, for example, limited entry could be highly threatening to commercial fishermen whose livelihoods are dependent on open access to resource exploitation. Similarly, cultural dislocation and disintegration of long-standing fishery communities could ensue. For reasons such as these, it is important to learn the interests and perceptions of each segment of the fishery.

The first category of interests are found in what might be called "directly affected groups," those who are directly involved in the exploitation of the resource. For any fishery, these would include the following: 1) the commercial fishermen, who derive their livelihood from the resource, 2) the sport fishermen, who enjoy the opportunity and right to fish, 3) the onshore fish industry engaged in the buying, processing, and marketing of the fish product, and 4) public agencies engaged in resource management, such as state departments of fish and game.

In the second category, broader public interest concerns should be taken into account. For example, to what extent does the resource represent an important source of food protein which is readily available at reasonable prices to the consumer? What is the broad economic value of the fishery to the nation (e.g., how many people are employed in all of its facets, how far ranging is the distribution market?)? Is there competition for use of the resource habitat (e.g. for navigation, dredging and filling operations, nuclear power plants, etc.)? Are any environmental and aesthetic values involved which merit protection for the enjoyment of future generations? These broader "interests" are much less tangible and readily identifiable than those listed under the first category. Hence, it becomes more difficult for decision makers to properly assess them unless some groups -- such as environmental groups -- become organized to articulate such interests.

In the particular case of the abalone fishery, public interest concerns do not loom paramount because of the relatively small size of the fishery, the restricted size of its market, and the "luxury" item character of the product.* Possibly the only public concerns that should be taken into account in this case are the ecological relationship of the resource to other species (e.g. the sea otter), and the views of non-abalone fishermen about the impact of abalone management on their fisheries.

Given the brief framework just developed, this chapter considers the attitudes and opinions of all segments of the abalone fishery and of other interested groups toward the resource, its problems, and its management.**

* Abalone is a relatively small but not insignificant fishery (2,587,000 lbs. were landed in 1974); its market range is basically restricted to California, while its high price (estimated at \$6.50-9.00/lb. on sales to restaurants) has made it predominantly a luxury item.

** Because of time pressures we were not able to contact those who are engaged in the retail sale of abalone.

This chapter is divided into three sections. First, the total population of each fishery segment is briefly characterized. At the same time, basic methodological decisions about sampling these populations for this study are summarized. Second, the way different segments define the problems with the abalone resource and fishery is presented. Third, the preferences about resource management held by the various segments is offered. Because of their large impact on the resource and because they appear to be most directly affected by recent legislation, the discussion in each of the three sections emphasizes the commercial divers.

Description of Relevant Groups

Commercial Divers

Methodology. According to Department of Fish and Game records, 506 individuals were licensed to take abalone in 1975 (383 as divers, 123 as tenders). While these license holders live in different California communities south of San Francisco, a large proportion of them (48.4%) are centered in the Santa Barbara area (see Table 3.1). As explained earlier (see Table 1.3), there is a high degree of turnover in the fishery; in 1975, the attrition rate from the previous year was 50%.

Table 3.1

Residence of All California Abalone License Holders, 1975
(in percentages)

San Diego	Los Angeles	Santa Barbara Area ^a	Central Coast ^b	North Central Coast ^c
14.4	19.7	48.4	8.6	8.4
(N=506)				

^aIncludes Ventura, Oxnard, and Simi.

^bIncludes Arroyo Grande, Morro Bay, San Luis Obispo, Cayucos.

^cIncludes Santa Cruz to San Jose to San Francisco.

In an effort to tap systematically the attitudes and opinions of this population, a random sample of divers^{*} was selected for personal interviewing. The sample was stratified according to number of years of experience in the fishery to insure that all levels of experience and involvement in the fishery would be proportionately represented. Personal interviews with these divers were conducted by trained interviewers between April-July 1976. The number of completed interviews totalled 44 (80% response rate). (For a complete description of methodological procedures followed, please see Appendix A.)

Because of the high turnover in this fishery, an effort was made to contact those license holders who had dropped out of the industry to explore patterns and reasons for out-migration from the fishery. The universe of drop-outs was defined as those individuals who had held abalone permits (either as divers or tenders) in 1974 and who did not renew these permits in 1975 (N=262). A mail questionnaire and follow-up letter responses were sent to all these individuals (for a copy of the questionnaire, see Appendix D). As shown in Table A.3 in Appendix A, a large number (39.3%) of the questionnaires were undeliverable because respondents could not be located (moved, left no forwarding address, no longer employed at the location, etc.). Of those receiving the questionnaire, 29.5% responded.

Using the above data base,¹ this section now moves to a brief description of the demographic characteristics of these divers, the prevalent patterns of recruitment into the fishery, their economic status, and predominant pat-

*The sampling was confined to divers following the advice of many in the fishery who suggested that divers (as compared to tenders) represented the core of the fishery and would be most knowledgeable about the resource and its problems.

terns of resource harvest. Because the sample was drawn randomly, the characteristics of the commercial divers described here should closely mirror those of the whole population (i.e., all current abalone divers). Throughout this discussion, the responses of the sample of current divers interviewed ("Divers") are occasionally compared to those of the drop-out license holders ("Drop-outs"),²

Demographic characteristics. As may be seen in Table 3.2, current abalone divers are, on the average, a young group (median age is 32). This is no doubt related to the physical exigencies of this occupation. Fifty per cent are married, and a third of them have children. Residentially, they are scattered in different California coastal communities, over a third making their homes in Santa Barbara. This is a highly educated group, as 59.1% have been educated beyond the high school level.

Contrasting the demographic characteristics of the "drop-out" group to current divers (see also Table 3.2), we find that the "drop-outs" are slightly younger (their median age is 29), and appear to be more "settled" -- at least in family terms. 63.8% of the "drop-outs" are married, and 72% of these have children. Additionally, they are even more educated than the diver group with 77.8% of "drop-outs" having attended college. These differences suggest that reasons for leaving the fishery may potentially be related to family considerations and to the availability of other occupational opportunities.

Recruitment and tenure patterns. Commercial divers were asked how they originally got involved in the abalone fishery, what expectations they had at the outset, and how long they had been diving. (Q. 2,3,4)^{*} In this regard,

* Throughout, refer to Appendices B and D for the text of the questions.

Table 3.2
Demographic Characteristics of Abalone Divers and of Drop-outs
 (in percentages)

	<u>Residence</u>			
	<u>San Diego</u>	<u>Los Angeles</u>	<u>Santa Barbara Area^a</u>	
Divers (N=43)	16.3	18.6	46.5	
Drop-outs (N=44)	4.5	31.8	31.8	
	<u>Central Coast^b</u>	<u>North Central Coast^c</u>		<u>Other</u>
Divers	9.3	9.3		0
Drop-outs	9.1	15.9		6.8

	<u>Age</u>					
	<u>Under 25</u>	<u>25-29</u>	<u>30-34</u>	<u>35-39</u>	<u>40-44</u>	<u>Over 44</u>
Divers (N=44)	18.1	22.7	25.0	9.0	11.3	13.6
Drop-outs (N=46)	15.2	37.0	19.6	8.7	8.7	10.8

(Median Age)

Divers...	32
Drop-outs...	29

	<u>Marital Status</u>		
	<u>Single</u>	<u>Married</u>	<u>Other</u>
Divers (N=44)	36.4	50.0 (32% of those married have children)	13.6
Drop-outs (N=45)	26.7	66.7 (80% of those married have children)	6.7

	<u>Education</u>					
	<u>Completed 8th Grade</u>	<u>Some High School</u>	<u>Completed High School</u>	<u>Some College</u>	<u>College Grad</u>	<u>Post Grad</u>
Divers (N=44)	2.3	4.5	34.1	36.4	15.9	6.8
Drop-outs (N=45)	--	4.4	17.8	55.6	13.3	8.9

^aIncludes Ventura, Oxnard, and Simi.

^bIncludes Arroyo Grande, Morro Bay, San Luis Obispo and Cayucos.

^cIncludes Santa Cruz to San Jose to San Francisco.

46.5% entered the fishery through contact with family or friends, 34.9% through other diving activities (e.g. sport diving), and 16.3% through work in another fishery.³ As to the reasons why they became abalone divers, 52.6% of the responses⁴ mentioned potential economic benefits, 35.0% made references to enjoying the environmental aspects of the job, while 12.2% mentioned notions of freedom and independence. Most divers, in fact, combined all three of these aspects in their answers as the following typical responses indicate:

Free lifestyle, own boss, adequate income, possible money bonanza...

Like to combine making a living with what I like to do...

Retirement within five years...looks like exciting life, romantic...Didn't see the problems at first...

Length of time spent working in the fishery is abstracted in Table 3.3 for both the "diver" and "drop-out" samples. As this table reveals, there exist small differences between the samples on this variable.**

Table 3.3

Length of Time Spent Working in the Fishery for Abalone "Divers" and "Drop-outs"
(in percentages)

	<u>Under 2 Years</u>	<u>2-4 Years</u>	<u>4-6 Years</u>	<u>6-8 Years</u>	<u>Over 8 Years</u>
Divers (N=44)	27.3	20.4	15.9	4.6	31.8
Drop-outs (N=45)	26.7	37.8	8.8	4.4	22.1

**

Considering the distribution of the "drop-outs" according to how long they had been in the fishery and recalling the high yearly attrition rate for the fishery as a whole (reported in Table 2.3), it is possible that our drop-out mail sample is biased toward the more "stable" and experienced fishermen. This is further suggested by the fact that 59.3% of the mail questionnaires sent to the "drop-outs" were returned as "undeliverable" (see Table A.3). Both of these considerations seem to indicate that the more "transient" element of the fishery is not properly represented in our "drop-out" sample. While this poses some questions as to the overall representativeness of our mail sample, the fact that the "drop-out" sample represents a "relatively stable" group -- one with considerable past involvement in the fishery -- possibly lends further weight and credence to the factors cited as reasons for leaving the fishery.

Patterns of harvest and economic status. Looking first at patterns of harvest, the median number of days spent diving per year is 99.7, while the median number of days spent on abalone-related activities other than diving (e.g., boat repair) is 59.7. The majority of divers (65.9%) dive from their own boats, 11.4% dive from a company boat, while 22.7% dive from boats belonging to other divers. Excluding the boat, the median price of abalone diving equipment is valued at \$1,250. Most of the divers operate from the Santa Barbara Harbor and harbors located in the Greater Los Angeles area (45.5% and 32.6%, respectively).⁵

While the size of the catch varies greatly according to diver, the median catch reported is 200 dozen per year. A great proportion of the divers sell their catch to only one processor (69.8%), citing high prices obtained and other economic relationships (e.g., processor owns boat, loans, etc.) as major reasons for this selling pattern.

Divers were asked their income from taking abalone and their associated expenses. As may be seen in Table 3.4, the median annual gross income from the taking of abalone is \$6,750.

Table 3.4

Gross Annual Income Derived from Abalone Taking for "Divers"
(in percentages)

<u>Under \$1,500</u>	<u>\$1,500-2,999</u>	<u>\$3,000-5,999</u>	<u>\$6,000-7,999</u>
22.7	11.3	11.3	13.6
<u>\$8,000-9,999</u>	<u>\$10,000-13,999</u>	<u>Over \$14,000</u>	
9.0	11.3	20.4	
<u>Median Gross Income</u>			
\$6,750			(N=44)

As these relatively low annual income figures suggest, a large proportion of divers (63.6%) have other sources of income in addition to abalone diving. Table 3.5 indicates the proportion of the divers' total net income which is derived from abalone taking.

Table 3.5
Per cent of Total Net Income Derived from Abalone Taking for "Divers"

76 to 100 %	48.8	
50 to 75 %	17.0	
Less than 50% annual net income	34.0	(N=41)

Among those divers supplementing their incomes from sources other than abalone diving, 32.1% are engaged in other fishery jobs (e.g. diving for sea urchins), 50.0% are engaged in non-fishery related jobs, while 14.3% derive additional income from sources such as pensions, welfare payments, or investments.

These economic data -- i.e. low median income, partial economic dependence on the fishery, and engagement in other employment -- suggest that a majority of participants in this fishery are receiving relatively low annual economic returns and many of them are not diving full time. These conclusions are supported by other data in the "diver" sample as well as by data in the "drop-out" sample. When asked whether they had ever considered leaving the industry, 65.9% of the current divers responded affirmatively. Major reasons cited for leaving included economic conditions (37.9% of all responses⁶), resource problems (17.2%), and the harshness of the environment and of working conditions (24.1%).⁷ When asked what they would do for a living if they were to discontinue abalone diving, 46.1% mentioned other fish-

ing jobs, 43.5% referred to land-based non-fishing related jobs, while a remaining 10.2% referred to other diving jobs, unrelated to fishing (e.g. on oil rigs).

Those who leave the fishery (as represented by our drop-out sample) do so primarily for economic reasons, although, as mentioned, family considerations and other opportunities may be factors contributing to the economic reasons. As may be seen in Table 3.6, 44.2% of the reasons⁸ given for discontinuing abalone diving referred directly to economic considerations, and an additional 22.9% to problems that are closely associated. Typical responses, in fact, interrelate economic problems and resource depletion, e.g.:

The business is too small for the amount of commercial divers working this area. The abalone beds were getting thinner and we were getting more divers -- they start with blacks and sea urchins. I quit because I couldn't see a future in it. But I like it. You should give it back to the older divers that had it 6 years ago, the fishermen that grew up with it, they know how to take care of it.

Not very many abalone left. Not enough money for this hard work and the danger involved. Long hours, costs a lot to stay in harbor. Overhead was a lot more than what I was making.

Economic: fuel costs, availability to locate good beds of abalone that had not been destroyed.

When I started diving the abalone were plentiful; in about 3 hours we would produce 30 to 40 dozen; then we averaged 10 dozen or more. In about 5 years we could only get 10 dozen about 10 times a year. I don't think we had 10 dozen in the last two years for a 6 hour day of diving.

The importance of economic reasons for leaving the fishery is enhanced when one considers the low median annual net income which "drop-outs" report for the last year they were diving: \$2,500. Unfortunately, we have no data on other sources of income for these former divers during their last active year.⁹

Table 3.6
Reasons Cited for Discontinuing Abalone Diving Among "Drop-outs"
 (in percentages)

Economic reasons	44.2	
Resource depletion/otter problems	22.9	
Health/age/injury factors	11.4	
Better occupation	9.8	
Family life	6.5	
Other	6.4	(N=62)*

*Includes multiple responses. Of 41 divers responding, 20 gave two reasons and one gave three reasons.

Upon leaving the fishery, the "drop-outs" become engaged in predominantly land-based jobs unrelated to fishing, as Table 3.7 indicates. The majority of these jobs are full-time (78.7%) and appear to bring higher incomes than those derived from abalone diving; "drop-outs" report a current median annual income of \$10,400.

Table 3.7
Occupational Breakdown for "Drop-outs"
 (in percentages)

Other fishery	15.2	
Other diving (non-fishing)	6.5	
On-land fishery-related (e.g., boat building, dive equipment, etc.)	8.6	
Other on-land jobs unrelated to fishing	65.2	
Retired/disabled	4.3	(N=46)

Although the majority of "drop-outs" have become engaged in land-based jobs, over half of them (55.6%) also report having considered returning to abalone diving (32.4% of these say, in fact, that they will seek a new li-

cense this year). An even greater proportion (81.6%) respond that they would return if certain conditions were to change, such as replenishment of the resource, improved economic conditions, containment of the sea otter, and opening of the north coast. It should be noted that responses given on this open-ended item were replete with detailed and highly specific suggestions on what ought to be done to enhance conditions in this fishery. The "drop-outs" apparently have some strong feelings about abalone diving and the resource.

While the preceding discussion presents an outline of the economic status of divers and "drop-outs", additional data are required before a comprehensive picture can emerge. As one example, the income data used here are for one year only. To make a fully accurate appraisal of income and fluctuations therein would require an average of several years.

Despite some data limitations a few conclusions are in order. First, most current divers are not getting wealthy from diving and neither are most of them relying on abalone diving as their sole source of income. Second, those divers who left the industry did so primarily for economic reasons and many of them are at least considering a return -- apparently in anticipation of better conditions.

Sport Divers

Identifying the universe of recreational fishermen who take abalone was somewhat difficult because anyone holding a California sport fishing license is entitled to take abalone.¹⁰ Hence, we chose to contact the officers of organized sport diving clubs in California as a way of gaining an understanding of the attitudes and management preferences of the sport sector. Mail questionnaires were sent to a total of 116 sport diving club presidents.¹¹

(For a copy of the questionnaire, see Appendix C.) Of these, 63 (or 54.3%) were returned. Six questionnaires (5.6%) were returned as undeliverable. Apparently, a few incorrect addresses had been supplied by the Councils. Many responses contained a substantial amount of information volunteered by the respondent in addition to the close-ended responses solicited in the questionnaire.

Our sample of sport diving club officers represents organizations which have been in existence for at least six years, with an average membership size of 49. This is an experienced group of divers who dive for abalone on a frequent (for an amateur) basis. On the average our respondents report taking 7.8 limits (5 per day) for abalone during 1975. Very few of the club officers report an interest in commercial diving -- only 14.3% (N=9) admit to having considered commercial diving.

In terms of demographic characteristics and socio-economic status, these sport divers represent an older, more educated and more affluent group than the commercial divers: their median age is 38, 84.1% of them have been educated beyond the high school level, and 66.6% make annual incomes of over \$15,000. Table 3.8 summarizes these characteristics of the sport diving sample.

Because our sample is composed entirely of club officers, it may be that it is not representative of all sport divers. Most likely the sample has a disproportionate number of experienced, long-term divers who have a better-than-average knowledge of the abalone resource and its problems. From this standpoint, the sample should be able to provide responses based upon much more than the casual acquaintance with abalone that a newer diver might have. And, because the sample is by definition composed exclusively of the diving

club leadership, their views may be expected to have a higher degree of relevance to those engaged in formulating abalone management policy.

Table 3.8
Characteristics of the Sample of Sport Diving Club Officers

1. Size of clubs: Mean = 49 members; Range = 5-300	(N=60)
2. Years respondent has been diving: Mean = 12.7 years	(N=63)
3. Average number of abalone dives per year: 14.5	(N=60)
4. Number of limits respondent took last year (1975): Mean = 7.8	(N=61)
5. Has respondent considered commercial diving -- yes: 9 14.3%	
no: 54 85.7%	(N=63)
6. Median age of respondent: 38	
7. Respondents having post-high school education: 84.1%	(N=63)
8. Respondents making more than \$15,000/year: 66.6%	(N=61)

Processors

Out of the total of seventeen processing permits issued by the Department of Fish and Game, only ten processors produced any abalone during 1975-1976. The inactive processors have quit production due to escalating ex-vessel prices and because of dwindling and inconsistent supplies of abalone. However, all seventeen processors plan on renewing their permits next year. For purposes of this study, six of the ten active processors were interviewed. These six account for the vast majority of all processed abalone in the state.

California abalone processors produced approximately 320,000* pounds of abalone steaks in 1975. Nearly 80% of this production was accomplished by the three processors located in Santa Barbara, with a single processor being responsible for 55% of the total domestic supply. Ninety per cent of the

* This figure does not include the amount of black abalone that is canned and exported.

supply was consumed in California, and an additional 990,000 pounds of abalone steaks were imported from Mexico into California. Hence, only 22% of the California market was satisfied by California abalone in 1975. The processors report that they are operating at about 25% of their full production capacity due to the dwindling supply of legal-sized abalone, and the situation has steadily worsened over the last five years.

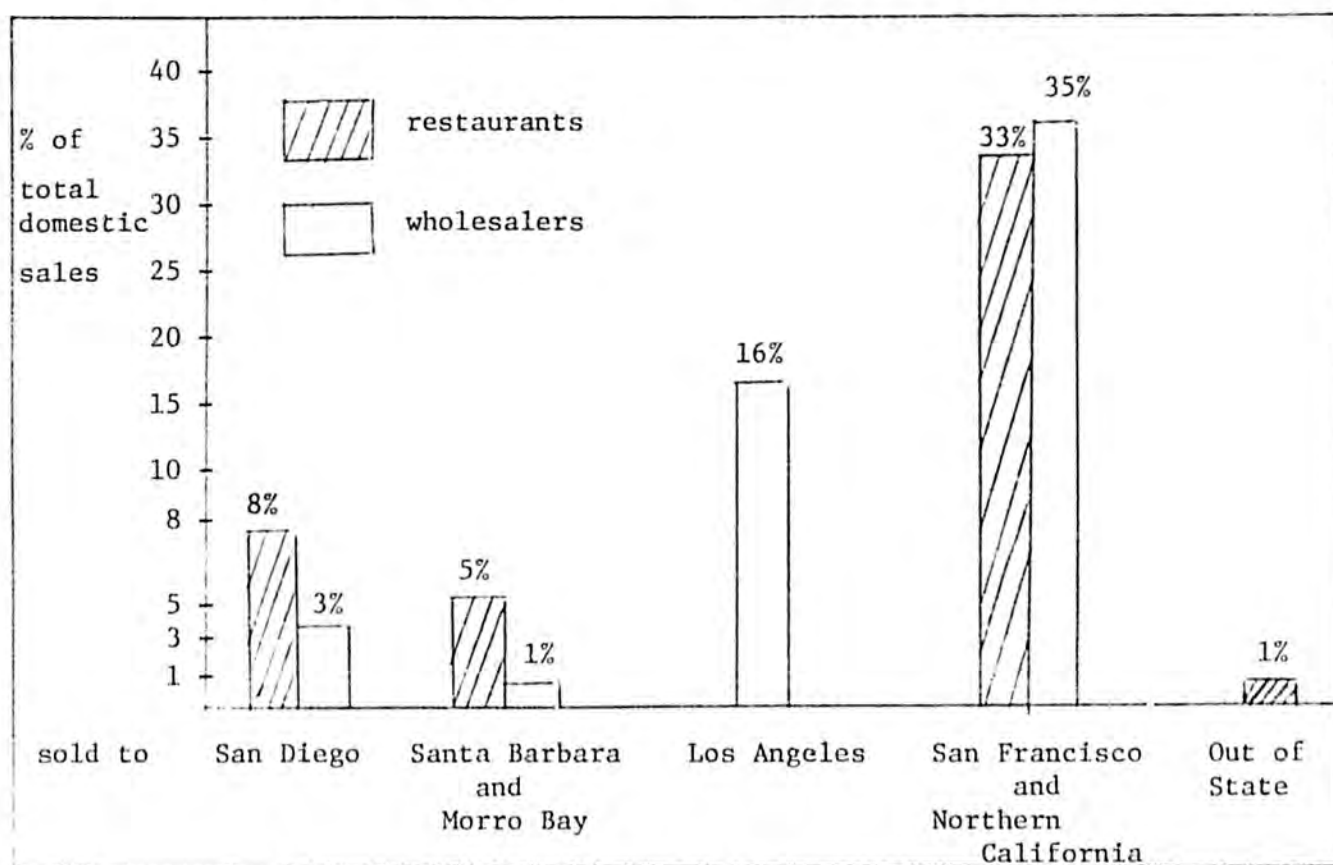
Processors face uneven demand through much of the year as it is heavily influenced by tourism in San Diego, Santa Barbara, Los Angeles and San Francisco (see Figure 3.1). The flow of seasonal supply is also inconsistent, as it is interrupted due to wind and weather conditions affecting navigation of the small crafts and diver visibility.

The price paid for abalone steaks varies according to the steak size, softness, and whiteness of color. The Sorenson or white abalone commands the highest price per steak pound as it is the whitest and softest of the gourmet class. A pound of top-quality abalone steak is sold to restaurants at an average of \$6.50 per pound, although some restaurants pay up to \$9.00 a pound when purchasing from a wholesaler. About 70% of the processor's selling price goes to the diver, 10 to 20% covers labor costs, and after paying for packaging, freight, and overhead the processor is left with about 6.5% net profit.

Processors generally buy abalone from their own group of divers. The top five processors in sales volume report buying from (on the average) 125, 35, 20, 8, and 6 divers, respectively.

This brief characterization of abalone processors makes it apparent that a relatively few firms dominate this part of the industry. The state of California provides the primary marketplace for their output except for the exported black abalones.

Figure 3.1

Domestic Sales of California Abalones by California Processors*

* Based upon interviews with six processors.

Resource Management

With respect to the management of the abalone resource, two particular groups stand out: the State Department of Fish and Game and the relevant committees in the state legislature. Because the Department of Fish and Game figures so prominently in the management of abalone, a brief description of its organizational structure seems appropriate at this point.

The Department of Fish and Game (DFG) is the dominant state agency in management of the state's fish and game resources. The DFG operates within laws delegating it certain powers and responsibilities and under general

policies set by the five-member Fish and Game Commission. The Director of DFG is appointed by the governor subject to confirmation by the state senate. In what seems to be an opportunity for confusion, the director is legally responsible for the Department's administration to both the commission and the governor. No clear demarcation of the director's dual responsibilities appears in law, so it is reasonable to assume that a de facto relationship based upon political exigencies develops between each director, governor, and commission. Because the commission is not permitted to regulate commercial fisheries without explicit legislative authorization, the Department assumes the major role in dealing with the commercial use of California's marine resources.

The state Fish and Game Code is quite diverse in its subject matter and approach to management responsibilities. Some laws mandate quite specific management provisions that DFG must follow while other code sections offer DFG wide latitude and discretion. DFG conducts research on its own as well as by contract. Taking fish or game requires a license, and under general requirements set out in the law DFG promulgates the exact terms and conditions under which licenses may be sold and used. DFG is also responsible for enforcement of the Fish and Game Code and its enforcement personnel are full-fledged peace officers with the power of arrest.

For administrative purposes the Department is organized into five regions, each with field personnel. Some Sacramento-based staff operations include the Marine Resources Branch, Anadromous Fisheries Branch, other similar branches, and the usual housekeeping offices to handle fiscal and personnel matters. In order to ascertain the attitudes and opinions of DFG personnel toward abalone management in general as well as to explore the ration-

ale followed in the recent enactment of AB. 2224 (limiting entry into the abalone fishery), several informal in-depth interviews were held with DFG administrators. These were selected from all DFG sectors relevant to abalone management (e.g. Sacramento-based personnel dealing with policy development as well as field personnel concerned with data collection and the enforcement of regulations).

Several state legislature committees dealing with abalone regulations were also considered. During the 1975-76 regular session of the California legislature, jurisdiction over fisheries legislation had been transferred from one committee to another in the Assembly following a committee reorganization necessitated by the death of a committee chairman. Abalone-related legislation was first heard by the Assembly Committee on Resources and Land Use, while legislation introduced later in the session was handled by the Assembly Committee on Water. The Senate Committee on Natural Resources and Wildlife maintained jurisdiction over the abalone legislation during the entire session.

Public Sector Groups

As mentioned earlier, public interest concerns would not appear to be significant in the abalone fishery because of the limited size of the market and the costliness of the product. Nevertheless, a few groups not directly involved in the fishery are concerned with abalone management because of the impact some abalone management plans would have on the sea otter. These groups perceive efforts to protect abalone by containing or relocating the California sea otter population as a threat to the otter's well-being and perhaps survival. Informal in-depth interviews were thus conducted with spokespersons for the Sierra Club and the Friends of the Sea Otter.*

*These two groups were identified as being interested in the abalone resource following an extensive informal telephone survey of environmental groups.

The Sierra Club is a national organization, with a large percentage of California members, that works on a wide variety of environmentally related issues. Friends of the Sea Otter concentrates its efforts on the preservation and enhancement of the small band of surviving sea otters along the California coast.

Several other non-abalone organizations were contacted for their views about fishery management in general and abalone management in particular. These groups included the Tuna Research Foundation, Fisherman's Union of America-Pacific and Caribbean area, Fishing Marketing Association, Salmon Unlimited, California Commercial Fishermen's Association and California Seafood Institute.

Summary

This section has identified and described the groups that are relevant to abalone management. Keeping in mind the major characterizations of these groups, we can now turn to their definition of the problems confronting the abalone fishery and resource.

Definition of Problems in the Abalone Fishery

Commercial Divers

Almost all commercial divers perceive problems in the abalone fishery. When asked the simple question whether any problems existed, 93% responded affirmatively.

Divers were asked for their perception of the seriousness of different problems in two ways: first in an open-ended item which allowed the diver to volunteer a spontaneous response and second in a closed-end, structured item which confronted the respondent with a set of problems and asked him

to evaluate their seriousness. It is always useful to contrast answers obtained through these two methods as a check on the validity of close-ended items. As may be seen in Table 3.9 (where responses to the open-ended item are abstracted) and Table 3.10 (responses to the close-ended items), the ranking of problems is, by and large, very similar.

The responses to both the open and closed-ended items suggest that the most important problems are perceived to be an inadequate supply of abalone, sea otters, the taking of shorts, too many commercial divers and activities of inexperienced divers.¹²

For each problem mentioned, divers were also asked to indicate who should be most responsible for solving the problem; i.e., individual fishermen, state government, fishermen's associations, processors, or some other group. As may be seen in Table 3.10, there is clear indication that commercial divers look toward the state government as the major source whence solutions to problems in the fishery should emanate.

Table 3.9
Definition of Problems in Abalone Fishery Among Commercial Divers
(open-ended responses) (in percentages)

	(all responses)	(1st mention)
Too few abalone	14.4	20.5
Sea otters	11.1	15.9
No area rotation	11.1	9.1
Poor management practices	10.0	13.6
The taking of shorts, cutting	10.0	2.3
Too many divers	8.8	4.5
Inexperienced divers	6.6	2.3
Sport divers	5.5	2.3
No aquaculture	5.5	---
Other	17.0	29.5
	(N=92)*	(N=39)

* Reported aggregating first, second, third, and fourth responses. (Divers were allowed to mention a total of up to 4 responses. Of the 39 who responded to this question, 27 mentioned two problems, 18 mentioned three problems and 8 mentioned four problems.)

Table 3.10

Definition of Problems in Abalone Fishery and Attitudes on Who Should be Responsible for Solving these Problems Among Commercial Divers
(in percentages)*

Problem	Problem rated as serious or very serious	Whose responsibility to solve problem					
		Individuals	State govt.	Fisherman's assoc.	Processors	Other	DK
Sea otters	66.7 (N=42)	--- (N=35)	74.2	5.7	---	14.2	5.7
Inadequate supply of abalones	65.9 (N=44)	--- (N=28)	67.8	7.1	3.5	14.2	7.1
Pollution	57.5 (N=40)	--- (N=34)	76.4	---	---	14.6	8.8
The taking of shorts	53.5 (N=43)	29.4 (N=34)	55.8	8.8	5.8	---	2.9
Too many commercial divers	50.0 (N=44)	2.8 (N=35)	74.2	5.7	5.7	5.7	5.7
Poaching	38.1 (N=42)	20.7 (N=29)	65.5	6.9	3.4	3.4	---
The twenty foot law	36.4 (N=44)	5.7 (N=35)	77.1	8.5	---	5.7	2.8
Too many inexperienced commercial divers	34.0 (N=44)	12.9 (N=31)	61.2	9.6	6.4	6.4	3.2
Competition from sport divers	25.6 (N=43)	14.2 (N=28)	60.7	7.1	---	10.7	7.1
Legal size is too small	13.6 (N=44)	--- (N=21)	61.9	6.8	2.3	19.0	---
Legal size is too large	6.0 (N=44)	--- (N=23)	60.9	13.0	4.3	21.7	---

* Questions read: "Here is a list of problems that have been suggested by other people associated with the abalone industry. As I read each one, would you please first tell me whether you think it is: (1) a very serious problem, (2) a serious problem, (3) somewhat of a problem, (4) a minor problem, or (5) not a problem at all. Next, I would like to know who do you think should be most responsible for solving this problem: individual fishermen, state government, fishermen's associations, processors, or some other group."

Sport Divers

The majority of sport divers responding to the mail questionnaire also perceive that there are problems with the abalone resource (90.3%). In some ways the sport divers' definitions of problems in the abalone fishery parallel those of the commercial divers. As may be seen in Table 3.11 (open-ended responses) and Table 3.12 (close-ended responses), sport divers point to sea otters, inadequate supply of abalone, commercial diver activity, overfishing, and the taking of shorts as major problem areas. Sport divers tend to give greater importance to commercial divers as a major source of problems in the fishery than do commercial divers themselves. While the sport divers tend to view the commercial divers as a serious threat to the resource, the converse is not true. Referring back to Table 3.10, only 25.6% of the commercial divers cited "competition from sport divers" as a major problem.

Table 3.11

Definition of Problems in Abalone Fishery Among Sport Divers
(open-ended responses) (in percentages)

	(all responses)	(1st mention)
Commercial divers	22.1	22.2
Inadequate supply of abalone	18.9	27.8
Sea otters	14.7	18.5
Too many sport divers	9.4	9.3
Diver behavior	6.3	1.9
No area rotation	4.2	5.6
The taking of shorts	4.2	1.9
Enforcement problems	4.2	1.9
Other	16.0	10.9
	(N=95)*	(N=54)

* Reported aggregating first, second, third, and fourth responses. (Divers were allowed to mention a total of up to 4 responses. Of the 54 who responded to this question, 27 mentioned two problems, ten mentioned three problems, and four mentioned four problems.)

Table 3.12
Definition of Problems in Abalone Fishery Among Sport Divers
 (closed-end responses) (in percentages)

Problem	Rating of Problem as "Serious" or "Very serious"	
Overfishing some specific areas	77.0	(N=61)
Commercial divers	69.3	(N=62)
Sea otters	55.5	(N=63)
The taking of shorts	51.6	(N=62)
Poaching	51.6	(N=62)
Commercial divers violating the 20-foot law	46.7	(N=62)
Pollution	43.5	(N=62)
Inadequate supply of abalones	40.0	(N=60)
Sport divers taking too many abalone	19.3	(N=62)
Sport size is too small	6.6	(N=60)
Sport size is too large	1.3	(N=60)

Processors

The six processors that handle most of the abalone market were asked to define the most pressing problems in the abalone fishery "from the perspective of the processor." Table 3.13 abstracts answers to this open-ended probe.

As Table 3.13 reveals, the problems mentioned most frequently by the processors do not differ substantially from rankings made by the commercial and sport divers. All three groups are concerned with an inadequate supply, sea otters, too many divers, and inexperienced and part-time divers. The processors, however, define these problems in somewhat different ways. Considering the problem of "inadequate supply of abalone," for example, a number of the processors defined this not in terms of depletion (i.e. insufficient numbers), but rather in terms of insufficient growth of the species because of such conditions as bad weather, pollution, and bed depths.

Table 3.13
Definition of Problems in Abalone Fishery Among Processors*

Inadequate supply of abalone	5
Sea otters	3
Inexperienced and part-time divers	3
Poor management/enforcement practices	3
Too many divers	3
Poachers and bootleggers	2
Size limit is too large in some beds	2
Mexican divers on Cortez	1

* Each processor was allowed to mention as many problems as he wished; most listed 3 or 4 problems.

In terms of poor management/enforcement practices, some processors pointed to the 20-foot law and suggested that the money spent on its enforcement would be better utilized by DFG in cracking down on bootleggers, poachers and divers taking shorts. A few processors saw the bootleggers' or "pirates'" disregard for the legal size of the abalone as a major source of problems; one processor estimated that between 30 to 50% of all the abalone taken was being sold directly to restaurants and private individuals, circumventing both the processors and the recording of DFG fish tickets.

Resource Management

Department of Fish and Game. As has been said before, the Department of Fish and Game is the primary abalone resource manager. Therefore, the way DFG defines problems with the resource is of major importance. The most concise statement of the Department's approach to abalone problems is contained in a report issued in January, 1975.¹³ The report, known as the Burge report after its main author, represents the Department's conclusions about the

biological status of the resource. The following reasons were said to account for the decline in abalone yield:

- 1) excessive picking pressure on sublegal abalone
- 2) size limits on pink, white and green abalone are too large
- 3) inevitable decline from overabundance of resource in early 1950's, when commercial harvesting started up in a big way
- 4) sea otter foraging
- 5) environmental degradation
- 6) sea urchin competition with abalone
- 7) poor larval recruitment and/or inadequate habitat
- 8) closure of some fishing areas
- 9) illegal activity by some divers

Because so much emphasis was subsequently placed on number one in the above list, some elaboration is in order. The Burge report found a very high mortality rate when divers picked, measured, and replaced sublegal size abalone. The abalone were frequently cut, so that they bled to death or could not resecure a strong hold and were therefore subject to easy picking by predators. It is apparent in the report that this problem was of overriding concern in the Department's eyes. As the report's recommendations and subsequent legislation make clear, it was assumed that picking and replacement of sublegals were highly correlated with the total number of divers and an individual diver's experience -- it was the least experienced who were primarily responsible for the premature mortality. This viewpoint played a major role in developing a new management approach.

From DFG's viewpoint the problem can be summarized as a quite limited available resource caused by improper harvesting, the sea otter, pollution and additional relatively minor causes. All this is seriously aggravated

by too many commercial divers. The decline in abalone yield evokes memories within the Department of the demise of the California sardine industry. Overharvesting, thought to be the principal agent responsible for the loss of a commercial sardine fishery, is widely feared by those making policy decisions about abalone. The Department's primary goal is a biologically based resource preservation program. That is, the Department is not motivated to advance economic or social goals through its commercial abalone management plans.

The role of the sea otter as an abalone predator is the source of a continuing and contentious debate involving DFG, abalone divers and groups such as Friends of the Sea Otter. As we have seen earlier in this chapter, commercial and sport divers both define the sea otter as one of the key problems facing the abalone resource. DFG concurs, as seen in the Burge report and in comments by other Department personnel. DFG biologist David Zeiner finds the sea otter one of nine major reasons for the decline of the abalone:

These otters have an insatiable appetite for shellfish, and with their average weight around 55 pounds, they eat one-fourth of their weight daily to sustain their high metabolism. They can reduce the abundance of shellfish by 80 to 90 per cent.¹⁴

Their migration, Zeiner continues, "becomes a threat to all shellfish, including the abalone."¹⁵

Daniel J. Miller, another DFG marine biologist, who holds the same evaluation of the problem as Zeiner, has authored a DFG proposal to the Federal Fish and Wildlife Service asking for state control over the otter (otters are now protected by the Marine Mammal Protection Act of 1972) with the intent of limiting the migration of the otter to Avila in the South and Half Moon Bay in the North.¹⁶ The justification for this transfer of responsibility, Miller says, is that the Federal Government looks just to the survival

of the otter, where the state has the responsibility to protect and enhance all fisheries in California.¹⁷

Both the biologically based conclusions and the attitudes about the future of the sea otter held by many DFG personnel are strenuously countered by biologists associated with the Friends of the Sea Otter organization.

Legislature. It is apparent that fisheries management, and specifically abalone management, is not a high-priority topic in a legislature beset with issues such as capital punishment, tax reform, coastal development, educational finance reform, and all the associated budgetary matters. There are a few legislators from coastal districts who take an interest in fisheries problems, but on the whole the legislature is not deeply concerned about the topic. With this situation in mind, it can still be said that a few issues in fisheries management arouse some legislative interest.

As a result of our interviews in the legislature, it is apparent that the legislature defined the problem with abalone as one of overharvesting. Essentially, the legislature agreed with the way DFG defined the problem. That is, there are too many divers who are overharvesting the species, in part because of the high sublegal mortality rate caused by "inexperienced" divers.

Public Sector Groups

After interviewing several active members of the Sierra Club and Friends of the Sea Otter one must conclude that these groups define abalone problems quite differently from divers and DFG. The blame for resource depletion is laid on man only, as one respondent said, "It is man and man alone who bears this burden."

Not only do these groups deny a major impact by the sea otter on abalone,

but they argue strongly that the sea otter enhances the abalone habitat and therefore helps the abalone. This occurs, they assert, because the sea otter chooses sea urchins for the primary diet (with abalone a second choice), thereby reducing the urchins' supposedly damaging impact on kelp beds. It is these kelp beds that sustain abalone.

There is a clear indication from these groups that if a choice must be made between allowing the sea otter to survive and expand or seeing the commercial abalone industry disappear or be drastically curtailed, they would choose the former. In other words, if they are wrong and the sea otter does seriously damage the abalone resource, they would prefer the sea otter to the abalone. These opposing definitions and choices, of course, set the scene for potential conflict.

The several unions and associations included in this study were not at all active in recent abalone management policy development. Thus, their definition of abalone problems was not relevant at this point.

Conclusion

Some concluding remarks can be offered about the way different groups define the problems besetting the abalone resource. In the first place, all agree that there is a problem, and in a way all agree that the problem is that there is an inadequate supply of the resource to satisfy the potential demand. Those who take the abalone for commercial and sport purposes, those who process it, those who manage the resource and those public sector groups concerned about the relationship between abalone and the sea otter all agree that there are not enough abalone.

The question of why there are not enough abalone is a different matter -- on this point opinions vary a bit. Although not necessarily in the same

rank order, commercial and sport divers, processors and resource managers all point to sea otters, poor resource management, too many divers, too many inexperienced divers, and pollution as the major causes of dwindling abalone stocks. Environmental groups place the blame solely on the "greed" of the divers and they absolve the sea otter.

Thus, the problems are defined with some uniformity except for the obvious disagreement of the environmental groups. It should also be noted that there are differences of opinion over the order in which different problems contribute to a supply inadequate for the demand.

Abalone Management Preferences

Commercial Divers

Following the questions on problem definitions, commercial divers were asked their opinions on different management alternatives through a variety of open-ended and closed-end probes. First to be determined was the extent to which divers were aware of the existing range of management alternatives. When asked whether they were familiar with "any proposals that might be suggested to establish a management program to solve problems in the abalone industry," 77.3% responded affirmatively. Most divers volunteered very specific proposals related to limited-entry restrictions, limited access to the resource, and abalone replenishment.

Divers were also asked what they would do if they could "make up a management program to solve problems in the industry." Table 3.14 summarizes answers to this open-ended probe. As indicated in this table, limited entry, enhancement of the resource through seeding and aquaculture, and certain methods limiting access to the resource are the highest ranking management preferences.

Table 3.14
Management Preferences Among Commercial Divers
 (open-ended responses) (in percentages)

	(All responses)*	(1st mention)
Limited entry into fishery	28.7	28.2
Augmentation of the resource (e.g., seeding, aquaculture)	20.5	23.0
Limited access to the resource (e.g., rotation, closures, quotas)	19.1	20.5
Stricter enforcement of regulations	12.3	7.6
Environmental control (e.g., pollution control, otter control)	9.5	10.2
Special administrative group (e.g., a committee for management policy made up of interest group representatives and DFG administrators)	9.5 (N=73)	10.2 (N=39)

* Reported aggregating first, second, third, and fourth responses. (Divers were allowed to mention a total of up to 4 responses.)

Divers' responses to a structured closed-end item (see Table 3.15) generally mirrored the volunteered preferences found in Table 3.14. It should be noted that in the open-ended responses, the second most preferred management alternative was enhancement of the resource -- an alternative which was not included in the closed-end item. However, there appears to be strong and growing support for seeding programs among commercial divers, as subsequent discussion of their willingness to pay for such programs will suggest.

Looking at Table 3.15 more closely, we see that divers are most familiar with proposals dealing with limiting entry, rotation, apprenticeships, increased license fees, seasonal closures, and quotas. In terms of their evaluations of these proposals, divers are most favorably disposed toward limited entry (77.3% agree), area rotation (81.8% agree), and apprenticeship programs (61.4% agree). Divers oppose most of the other management proposals

Table 3.15

Management Preferences Among Commercial Divers
(Close-ended responses in percentages, N=44)

74

Proposal	Have heard of proposal	Opinion of Proposal					
		Strongly agree	Moderately agree	Neutral	Moderately disagree	Strongly disagree	Don't know
Limiting the number of licensed divers	97.7	61.4 77.3	15.9	6.8	9.1 15.9	6.8	--
Rotation of open and closed fishable areas	84.1	59.1 81.8	22.7	2.3	9.1 15.9	6.8	--
Requiring new divers to serve a probationary period as apprentices	75.0	43.2 61.4	18.2	9.1	9.1 27.3	6.8	--
Increasing the license fee	86.4	6.8 27.3	20.5	6.8	9.1 65.9	56.8	--
Placing a quota on the number of abs taken by the industry as a whole	40.9	6.8 18.2	11.4	9.1	11.4 63.7	52.3	--
Placing a quota on the number of abs taken by any diver	65.9	6.8 15.9	9.1	11.4	13.6 70.4	56.8	--
Longer closed seasons	79.5	-- 13.6	13.6	9.1	11.4 77.3	65.9	--
Placing a tax on the number of abalone taken	29.5	4.5 9.0	4.5	13.6	6.8 59.1	52.3	--
No change in present regulations	--	9.1 15.9	6.8	4.5	18.2 72.7	54.5	--
Limiting the number of vessels	20.5	10.2 23.0	12.8	28.2	7.6 46.0	38.4	2.5

suggested. In rank order they disagree with longer closed seasons (77.3% disagree), individual diver quotas (70.4%), increased license fees (65.9%), industry-wide quotas (63.7%), taxes on the catch (59.1%), and vessel limitations (40.9%).

Although they generally do not favor increasing license fees, commercial divers do appear to be willing to pay additional money to sponsor abalone enhancement programs. When asked specifically whether they would pay additional license fees for seeding purposes, 75.0% of the divers responded affirmatively. Table 3.16 indicates how much money divers would be willing to pay per year to sponsor such seeding programs.

Table 3.16
Money Commercial Divers Would Be Willing to Pay for Seeding Programs
(in percentages)

Under \$25	11.7
\$25 to \$75	11.7
\$76 to \$150	41.1
\$151 to \$250	11.7
\$251 to \$500	5.8
Over \$500	5.8
Don't know	11.7
	<u>(N=34)</u>

It is our impression, though, that while divers are in favor of seeding programs, they would prefer that such programs be publicly sponsored by the state DFG rather than through private means. This is suggested by divers' reactions to plans recently announced by ARCO and California Marine Associates to begin farming abalone at an ARCO offshore oil platform in the Santa Barbara Channel. When asked about these plans, 44.1% of the divers reported their

awareness of some potential effects of these farming efforts. The majority cited potential detrimental effects (i.e., 53.3% referred to damage to the market, and 9.1% expressed fears of diver obsolescence) while only 6.8% cited potential benefits for the resource. This type of private attempt at resource augmentation clearly arouses some concerns among commercial divers. Typical responses are summarized below:

When someone starts farming it's going to lower the price of abalone. If they're going to start farming, I'm going to start writing letters asking for a job because that's what I want to do!

...They'll make money and get us out of business.

If farming abalone got big, it may lower prices and hurt me.

The program will try to monopolize the industry. What happens to the small businessmen? They're not benefitting the reef as a system.

As demonstrated by the Burge report and by the passage of AB 2224, limited entry is no longer a remote resource management alternative. Therefore, the opinions of divers on factors which should be taken into account in allocating limited entry permits was ascertained. Table 3.17 presents the proportion of divers favoring different methods of allocating licenses. Respondents were asked to express their approval or disapproval of each item in Table 3.17. The top three factors are years of experience (68.2% in favor), economic dependence (54.5% in favor), and size of the catch (50% in favor).

In conclusion, then, commercial divers seem to be very knowledgeable and aware of a wide range of alternative methods of managing the fishery. As discussed earlier (Table 3.10), the majority point to the state government as the party that should bear the greatest responsibility for solving problems in the fishery. The management options most preferred by the divers -- limited entry, area rotation, and publicly sponsored abalone enhancement

Table 3.17
Commercial Divers' Preferences on Factors That Should Be Considered in
Allocating Limited Entry Permits
 (in percentages)*

Factor to be considered	Proportion in Favor
Number of years in the industry	68.2
Proportion of income derived from the abalone industry	54.5
Size of preceding year's catch or number of landings	50.0
Passage of a diver proficiency test	45.5
Economic hardship	34.1
Amount of money invested in equipment	15.9
Applicant's residence	13.6
	(N=44)

* These criteria are considered as providing a possible basis for a point system similar to that described for Alaska in Appendix E. In addition, two alternative allocative procedures were considered: license auction, favored by only one diver (2.3%) and allocation by lottery, favored by eight divers (18.3%).

programs -- are also methods that fall within the purview of the Department of Fish and Game. This apparent acceptance of the state's role in the management of the fishery, however, is tainted with a general sense of mistrust of DFG's management performance. When commercial divers were asked to evaluate the present management of the abalone fishery by DFG, a large proportion of the divers (65.0%) offered "poor" or "very poor" evaluations (Table 3.18). Moreover, some commercial divers (38.6%) reported that DFG enforces abalone regulations selectively -- in their opinion, to the detriment of the commercial diver. This generalized sense of mistrust, it would seem, may create problems for the enforcement of any new management methods adopted by DFG which do not conform to the preferences of the commercial divers.

Table 3.18

Opinions on DFG Management of the Abalone Fishery Among Commercial Divers
(in percentages)

<u>Quality of Management</u>		
Excellent	--	
Good	4.6	
Adequate	25.5	
Poor	41.8	
Very poor	23.2	
Don't know	4.6	(N=43)

Sport Divers

In keeping with their tendency to define problems with the resource largely in terms of commercial overfishing (too many divers taking too many fish) and in terms of improper diver behavior (taking shorts, poaching, 20 foot violation), sport divers tend to volunteer solutions which call for stricter enforcement of regulations. As may be seen in Table 3.19, the "stricter enforcement/stiffer penalties" option receives the highest rating.

Table 3.19

Management Preferences Among Sport Divers
(open-ended) (in percentages)

Stricter enforcement/stiffer penalties	58.0	
Contain sea urchins	11.6	
Catch quotas	7.1	
Aquaculture	6.2	
Change size limit	5.3	
Area rotation	5.3	
Moratoria	4.4	
Other	2.6	(N=117)*

*Total equals 100.5% due to rounding error. These responses were 117 preferences to eleven specified problems by 63 divers.

Additionally, sport divers were asked a set of questions dealing with specific regulations related to sport diving. The great majority of sport divers (88.1%) are opposed to opening up the area north of Point Lobos to commercial divers. A similar proportion (83.8%) also feel that prohibitions on the use of scuba gear by sport divers in the area north of Point Lobos should be maintained.

Much as the commercial divers, sport divers generally support resource augmentation efforts. 72.5% report that they would support a licensing plan which required a special abalone stamp if the money were earmarked for a seeding program. Most of the sport divers, though (66.0%) are opposed to the idea of any state lease of beds for commercial use which would prohibit access to sport divers.

Finally, in terms of their evaluations of DFG management of the abalone resource, sport divers report critical opinions -- although not to as great an extent as commercial divers. As may be seen in Table 3.20, 57.9% of sport divers rate DFG management as "poor" or "very poor". In a related question, 26.2% perceive that DFG is selective in the enforcement of regulations; most of these respondents suggested that DFG favors commercial divers.

As we saw earlier, those commercial divers who felt DFG enforced rules selectively said that commercial divers were the target of "special" DFG attention. Now some sport divers are suggesting DFG singles them out for "special" attention.

Table 3.20

Opinions on DFG Management of the Abalone Fishery Among Sport Divers
(in percentages)

<u>Quality of Management</u>		
Excellent	3.2	
Good	12.9	
Adequate	24.1	
Poor	46.7	
Very poor	11.2	
Don't know	1.6	(N=62)

Processors

As will be discussed in Chapter 4, some processors were influential in the passage of AB 2224 so it is not at all surprising that they report favoring limited entry provisions. The underlying expectations among processors seems to be that limited entry will increase the degree of "full-timeness" and "professionalism" in the fishery by eliminating part-timers. In turn, this will make the relations with divers easier and, in their opinion, improve the long-term supply of abalone.

The one management option which processors unanimously oppose is catch quotas, either for individuals or for the industry as a whole. Processors feel that quotas would tend to penalize the mainstay of the industry -- the serious and hard-working diver. Some processors also feel that the industry-wide quotas would not be biologically sound as the abalone would deteriorate and be wasted if not picked after reaching legal size.

Since it appeared that a limited entry bill (AB2224) would be adopted, processors were asked what future management efforts they would propose. As may be seen in Table 3.21, major future agenda items for processors in-

clude working for a seeding program and opening up the north coast for commercial use.

Table 3.21
Future Management Proposals Favored by Processors*

Seeding program	5	
Opening of north coast	4	
Size changes	2	
Limited entry for sport divers	2	
Elimination of 20-foot law	1	
Tariffs on Mexican abalone	1	
Rotation of areas	1	(N=6)

* Respondents could offer as many proposals as they wanted.

Unlike the commercial divers, the processors do not seem to be concerned with the potential effects of abalone farming by the ARCO oil platform. Most of them tend to view this effort as an experiment and tend to minimize its importance and potential consequences. Of course, if the experiment succeeds, they stand to gain some business.

In regard to evaluations of the Department of Fish and Game, most of the processors characterized their relationship with DFG as good. There were no serious criticisms of DFG offered by the processors.

Resource Management

Department of Fish and Game. Prior to holding public hearings and attempting to draft implementing legislation the Burge report represented both DFG's outlook on the problem of the abalone fishery and its views on required management of the resource.¹⁸ What happened to the report will be discussed in the next chapter, but the report can be used here to illustrate how DFG

approached a new abalone management program.

The Burge report contains the following major management recommendations:

- 1) limit entry to the commercial fishery
- 2) shorten the commercial season to six months
- 3) reduce the size limits on pink, green, and white abalone
- 4) establish landing quotas for each type of abalone
- 5) shorten the season and reduce the multi-day trip limits for sport divers in Southern California
- 6) shorten the season and reduce the bag limits for sport divers in Northern California
- 7) increase DFG's role in abalone mariculture
- 8) increase the commercial diving permit fee to \$200 per annum immediately and to \$500 per annum in 1980

In keeping with the opinions of the divers, processors and public sector environmental groups, DFG ranks a limited entry program at the top of its suggested management changes. The proposals for change, however, go much further to include such new management programs as the establishment of quotas, shorter seasons, and changed size limits. The Burge report envisioned an extensive overhauling of abalone management, and it is therefore not surprising that it met with resistance.

Absent from the Burge report was a recommendation to open the coast north of Point Lobos. Because this possibility was suggested by processors and some divers, it deserves further mention at this point. While sport divers and shorepickers may take limited numbers of abalone, all commercial abalone activity has been prohibited (by law) along the entire coast from Point Lobos to the Oregon border since 1945. At a time now when the abalone yield is declining, it is not at all surprising that commercial divers and processors

have suggested elimination of this prohibition. DFG has chosen to not reopen the north coast issue at this time.

The original rationale for closing the north coast was a conclusion that the resource was simply not plentiful enough to support commercial activity. Apparently this was a conclusion initially urged on DFG by coastline residents, and confirmed by DFG's own research during the 1950's. A combination of a coastline that is quite rocky, cold water which results in slower abalone growth, abalone which are found mostly in a narrow band near the shoreline, and frequent inclement weather are also reasons cited as evidence that commercial activity is not appropriate north of Point Lobos.

However, controversy periodically arises over the adequacy of DFG's data about the north coast resource and its accessibility. Some claim that abalone is scarce only at those few selected spots with the easiest access and thus the most picking. Along many other areas, it is claimed, the abalone are present -- ranging in supply from adequate to overabundant. In recent times the Department has chosen not to invest the time and money that would be necessary for a thorough study of the north coast resource.

To even mention the possibility of reopening all or part of the north coast generates hostile reactions by those sport divers and local residents who currently enjoy exclusive access to abalone. Based upon interviews with DFG officials, it is apparent that their concerns influence the way DFG approaches the issue. Likewise, DFG recognizes that any commercial activity on the north coast must be monitored very carefully, including a close and continuous check on the status of the major abalone beds, the number of commercial divers working the area, and their total landings. These activities would impose a new administrative burden on DFG, along with the attendant costs.

Furthermore, it appears that DFG is convinced that the controversy likely to arise at a reopening attempt would make it impossible to secure the required legislation. Taken all together, these considerations have resulted in a departmental inclination to retain the status quo on the north coast.

Legislature. A genuine legislative concern about overharvesting a resource such as abalone is evident. During interviews, references to sardines and their disappearance were common, along with an expression of determination not to allow the abalone fishery (or any fishery) to suffer the same fate. However, the concept of limited entry as a fisheries management plan also evokes comment and concern. Limited entry, after all, is a serious governmental restriction upon an industry and as such it has the potential to touch off a philosophical discussion about the "proper" role of government in the economy. Any attempt to limit entry to all fisheries or even a few select ones would certainly produce heated controversy. And yet the legislature approved a limited entry bill for the abalone industry in 1976. All the parties to this legislation (AB 2224) -- DFG, processors, divers and industry lobbyists -- agreed that limited entry for abalone was necessary and that it was a special case not likely to set a precedent. Based upon this uniform opinion, the legislature avoided a serious consideration of the limited entry concept.

From a legislative viewpoint, abalone is not a compelling policy concern, but one on which the legislature is willing to act if DFG and the affected parties effectively present their case.

Public Sector Groups

None of the public sector groups interviewed for this study participated in the development of recent abalone legislation; although their views regard-

ing any implications that it might have for the sea otter are well known to policy makers in Sacramento and Washington. The environmental groups strongly advocate giving free rein to the sea otter, and if they are correct in their belief that the sea otter improves the abalone habitat, then their contention that abalone and sea otters can survive together has merit. But with respect to the fishery (as distinguished from the species), one respondent argues, "abalone is a luxury product and not, therefore, an essential fishery." In other words, if there must be a choice between the sea otter and a viable commercial abalone industry, these groups will strive to secure a management plan that protects the sea otter. However, in previous policy statements the environmental groups have supported resource augmentation and area rotation as means to enhance the commercial take.

The several unions and fishermen's associations were asked for their views on limited entry as a general management plan. Opinion was split, with most respondents against the concept. One recurring complaint that led many to voice negative feelings about limited entry was the perceived inability of government agencies to fairly administer such a plan. None of those unions and associations interviewed felt that a limited entry program in abalone had an impact on them by way of a precedent. They all pointed to the differences between abalone and the fishery (ies) with which they were familiar and then argued that abalone was a special case.

Summary and Conclusions

Chart 3.1 provides a rough summary of the way different affected groups define the problems with the abalone resource and also shows their preferences for management of the resource. While much of what is in the chart is self-evident, several trends deserve special notice.

Chart 3.1

Summary of Problem Definition and Management Preferences by Affected Groups*

	Problem Definition	Management Preference
Commercial Divers	Inadequate Resource Otters Shorts Pollution Too many commercial divers Poor management practices	Limited entry - by number of divers and apprenticeships Resource augmentation No quotas Keep present seasons To tax on abalone take Area rotation
Sport Divers	Otters Inadequate resource Commercial divers Overfishing Shorts Poaching	Stricter enforcement/ stiffer penalties (against commercial divers and poachers) Contain otters Resource augmentation Keep north coast closed to commercial divers
Processors	Inadequate resource supply Otters Too many divers and too many inexperienced commercial divers Poor management/enforcement	Resource augmentation Open north coast to commercial divers No quotas
Resource Management	Too many divers and too many inexperienced commercial divers Improper harvesting Otter Pollution	AB 2224 ---→ reduced number of divers Shorter seasons Landing quotas Reduce some size limits Resource augmentation
Public Sector Groups	Divers - too many Inadequate enforcement	Give otter free range Resource augmentation Area rotation

* The entries in each cell are not in any particular order.

The first point that should be highlighted in Chart 3.1 is a fairly high degree of consensus on problem definition among divers, processors and resource managers. There are some important differences when it comes to management preferences, such as DFG's omission of area rotation and the strong desire of sport divers to keep the north coast off limits for commercial activity. Nevertheless, we found considerable support for the basic thrust ultimately embodied in the recently passed legislation (AB 2224).

Sea otters are clearly an important element in any listing of problems. All but the public sector groups see the sea otter as a negative factor contributing to a decline in the resource. What is interesting is that while commercial divers, processors and resource managers perceive the sea otter as a problem, they do not emphasize management preferences that might resolve the sea otter problem. To be sure, these groups would like to do something about the sea otter, but whatever their solutions to this problem might be they are not mentioned prominently in response to our questions. Despite their feelings about the problems caused by the sea otter, members of these groups apparently don't see any realistic opportunity to solve the problem so they turn their management preferences to other choices which stand a better chance of acceptance. Alternatively, it is possible to speculate that the reason that management preferences to "deal" with the otter were not prominently mentioned is that divers, processors, and resource managers do not really see the otter as an important contributor to the declining commercial fishery. In any event, attempts to contain or eliminate the sea otter will run head-on into conflict with key environmental groups and a difficult struggle can be predicted.

Resource augmentation stands out as a preferred approach by everyone

directly involved. To a certain extent, this management preference is a motherhood issue when it is stated in the abstract sense of simply increasing the supply of abalone through a seeding/mariculture program. However, conflict is likely to develop when any serious, large-scale effort is undertaken. For example, a full-blown seeding program may be accompanied by bottom leasing or area rotation plans and the details of any such plans may generate disagreement over locations, seasons, size of legal abalone from the seeding, etc. Likewise, we have seen in our data the beginning of controversy over the kind of abalone farming California Marine Associates and ARCO are starting in the Santa Barbara Channel.

Footnotes to Chapter 3

- 1 In addition to examining the attitudes and opinions of the abalone fishermen rank and file, efforts were also made to reach what might be called the fishermen leadership groups. Representatives of the California Abalone Association (a group of commercial divers organized since 1971) and the California Sea Food Institute were contacted and interviewed informally.
- 2 It should be noted that these two samples are not strictly comparable. First, the methods used to obtain information from each group were quite different: a personal interview in the "diver" case, a mail questionnaire in the "drop-out" case. Secondly, the "diver" sample includes divers only, while the "drop-out" mail questionnaire was sent to all divers and tenders who did not renew their 1974 licenses in 1975. Nevertheless, it is our impression that respondents in the mail questionnaire consisted mainly of divers, as all the questions pertaining to diving activities were answered.
- 3 The remaining 2.3% was in the miscellaneous category.
- 4 Adding up 1st and 2nd mentions.
- 5 Another 9.3% work out of Half Moon Bay, 7% from San Diego, and 4.7% from Morro Bay.
- 6 Adding up 1st and 2nd mentions.
- 7 Another 10.2% of responses dealt with factors such as other aspirations, wish for increased security, etc.
- 8 Adding up 1st and 2nd mentions.
- 9 In regard to other patterns of harvest, the "drop-outs" closely resemble the current divers sample, e.g. they report having dived a median number of 100 days per year; 62.8% dived from their own boat, 32.6% from other divers' boats, and 4.7% from a company boat; and 78.3% sold their catch to one processor only. The only basic differences between the two groups is the size of the catch reported. The median number of abalone dozens per year reported by the "drop-outs" is 60 compared to a median of 200 for the "divers".
- 10 Another possible way of identifying abalone sport divers -- divers registered to purchase air -- also did not yield sufficient information as one could not assume that they would be interested in taking abalone.
- 11 The following clubs were contacted: 42 clubs belonging to the Central California Council of Diving Clubs (which includes clubs from Fort Bragg to San Luis Obispo), 56 clubs belonging to the Greater Los Angeles Council of Diving Clubs (clubs from Santa Barbara to Orange County), 10

clubs belonging to the San Diego Council of Diving Clubs, and 8 clubs belonging to the Valley Council of Diving Clubs (San Fernando Valley).

- 12 An inadequate supply of abalone, seen as the most pressing problem, is a problem caused by some combination of the other problems mentioned. In this sense the list of problems should be seen both as an indication of a perceived inadequate supply and as a presentation of the perceived causes of that inadequacy. It is interesting to point out the differences that do exist between the open and closed-end responses. In the open-ended question (Table 3.9) two problems not included in the closed-end item (Table 3.10) rank among the top problems mentioned -- i.e. no area rotation and poor management practices. This is symptomatic of the commercial divers' evaluations of state management practices -- a topic which will be treated below. Additionally, "Pollution" ranks as one of the most important problems in the closed-end item, while it is rarely mentioned in the open-ended responses.
- 13 Richard Burge, Steven Schultz, and Melvyn Odemar, "Draft Report on Recent Abalone Research in California with Recommendations for Management," Department of Fish and Game, Presented to California Fish and Game Commission, January 17, 1975. This section depends heavily on the Burge report.
- 14 David Zeiner, Oakland Tribune, February 25, 1976, p. 49.
- 15 Ibid.
- 16 Daniel Miller, Santa Cruz Sentinel, February 19, 1976, page 2, and The San Jose Mercury, April 19, 1976, page 13.
- 17 Ibid.
- 18 Burge, et al., op. cit.

Chapter 4

THE POLITICS AND ADMINISTRATION OF ABALONE MANAGEMENT PLANS

Introduction

A full understanding of how fisheries management plans are developed and implemented requires a careful assessment of relevant political forces. Management plans emerge from a political process in which different and often competing interests strive to advance their own objectives and viewpoints. Any potential management plan must be judged (in part) by its prospects of emerging from the political process. Some plans will so antagonize key actors in the political process that ultimate acceptance becomes impossible, while other plans take into account the potential reactions of those who make the final decisions. This chapter will show that politics -- thought of as conflict over the appropriateness of proposed policy -- plays an important role in the abalone fishery. It should be emphasized that in no way does our use of the term "politics" carry with it a negative connotation; politics is very much a part of any policy process, and the development of abalone management plans is no exception. The primary example of these political forces at work comes from the recent history of a bill designed to more closely manage the abalone industry.

AB2224: Politics and Legislation

During the 1976 session the legislature passed and the governor signed AB2224, a bill which marked a new departure in abalone management. The bill, introduced by Assemblyman Vincent Thomas, contains several major provisions:¹

- 1) Prohibits the commercial taking of any species of abalone during February and August. (Since 1970 the law has prohibited taking

pink, red, green and black abalones during these two months.)

- 2) Increases the annual commercial abalone permit fee to \$200 for divers and \$100 for crew members.
- 3) Provides for the issuance of a commercial abalone diving permit in January, 1977 to only those who held one during 1976 and to an additional 5% (chosen by lottery) who can pass a proficiency test or who have held a diving or crew member permit in at least three years previous to 1976.
- 4) Requires a permit holder to land at least 10,000 pounds of abalone or make 20 landings in order to be eligible for a permit in succeeding years.
- 5) Directs the Fish and Game Commission to set the total number of abalone permits that will be issued once the existing number is reduced to 200 or by no later than January 1, 1981. As modified by AB2880, the number of permits established by the Commission may be fixed either above or below the 200 level.
- 6) All of the above provisions are in effect until January 1, 1981, unless the legislature changes the date in subsequent legislation.

This is essentially a limited entry law that restricts the number of commercial abalone licenses, does not provide for any "buy-back" program and uses a lottery to provide entry for those who are not grandfathered into the industry.

As discussed in previous chapters, AB2224 resulted from DFG's "Burge Report," which in turn was produced at the request of the Fish and Game Commission. So that they can be kept in mind during this discussion, the eight major recommendations in the Burge Report should be repeated:

- 1) limit entry to the commercial fishery
- 2) shorten the season to six months, to be split into equal segments
- 3) reduce the size limits on pink, green, and white abalone
- 4) establish landing quotas for each species
- 5) shorten the season and reduce the multi-day trip limits for sport divers in Southern California
- 6) shorten the season and reduce the bag limits for sport divers in Northern California
- 7) increase DFG's role in abalone mariculture
- 8) increase the commercial diving permit fee to \$200 immediately and to \$500 in 1980

Using authority to regulate sport fishing first delegated by the legislature to the Fish and Game Commission in 1945, the Commission responded to the Burge Report by changing the regulations for abalone sport divers, effective March 1, 1976. The daily bag limit was reduced from 5 to 4 statewide and the diver now must keep the first four abalone of legal size he takes. No longer can the sport diver keep looking for larger and larger-sized abalone and replace the smaller legals. The open seasons were also changed for sport divers. North of Yankee Point the open season is April 1 - June 30 and August 1 - November 30. South of Yankee Point the open season is March 14 - January 14, with the exception of the northeast side of Catalina Island where there is an area that is only open April 1 - October 1.

In the commercial sector, the report felt that the recommended changes would reduce the number of divers to approximately 70 within five years. Seventy was estimated to be an appropriate number of divers in relation to the resource available. The limited entry part of the report received the most emphasis.

Upon publication of the draft report, and before introducing implementing legislation to deal with the commercial fishery, Burge and his co-authors held public meetings in Santa Rosa, Santa Barbara, and San Diego. These very well attended meetings were designed to allow the affected parties an opportunity to hear about the report and offer comments; feelings often ran high as the more controversial parts of the report were discussed during the meetings. In Santa Rosa the sport divers -- who were clearly in a majority at this meeting -- were annoyed at the report's reduction in bag limits and the proposed shorter season, but apparently their greatest wrath was directed at DFG for "inadequate" enforcement of the law prohibiting commercial activities on the northern coast. Extensive illegal commercial activities were alleged.

Both the Santa Barbara and San Diego meetings were dominated by commercial divers and processors. Almost unanimously, those who spoke at these two meetings favored the general tone of the report with its emphasis on a greater degree of state management of the industry. Specifically, the concept of limited entry was endorsed. What aroused strong opposition were the proposals for shorter commercial seasons and a reduction in size limits. Both divers and processors argued that they simply could not stay in business if the season was shortened to six months as proposed. A complete shutdown of the industry was the predicted outcome of a six-month season. And in what seems like a reversal of roles, the commercial interests voiced disagreement with DFG's proposal to lower the size limit on certain types of abalone. The CAA argued that a reduction was unjustified on biological grounds, and processors especially were concerned about the inferior ratio of usable meat to shell weight in smaller abalones. The DFG size limit proposal was coupled with a quota on total landings, but the divers and processors did not believe that

adequate data were available to set appropriate and fair quotas. There were also intimations that not all landing information could be relied upon; that some "fudging" was occurring. In light of these alleged problems, the divers and processors argued for a more conservative approach than DFG.

Other major topics of concern at these meetings and in several follow-up letters were the sea otter and the status of commercial activity along the north coast. Not surprisingly, commercial divers and processors had very unkind remarks to make about sea otters. They strenuously argued for the development of a plan to "contain" the sea otters to their present feeding grounds along the central part of the coast. It was also clear from comments made at the Santa Barbara and San Diego meetings that opening the north coast for commercial activity was quite attractive to the divers and processors. They claimed that the resource in the north was adequate to support limited and carefully controlled commercial taking.

A formal position paper which made point-by-point comments on the Burge Report was prepared by the California Abalone Association (CAA).² As mentioned in Chapter 1, the CAA represented divers and processors who were estimated to account for over 2/3 of the abalone landings. After agreeing with the concept of limited entry and need for a moratorium on new commercial diving permits, the CAA paper suggested a few relatively minor deviations from the Burge Report approach to implementing the moratorium. With respect to other key parts of the Burge Report, they strongly opposed 1) shortening of the season to six months, 2) reduction in some size limits, and 3) landing quotas. The CAA also advocated several additional policy changes; these will be discussed in a subsequent section.

It was apparent from the meetings and correspondence that the DFG report

had been received with mixed reactions. On the major point of limited entry all involved parties seemed in basic agreement -- no easy task indeed. Controversy centered around the length of the season, quotas, the north coast and sea otters. After digesting the input, DFG officials modified their earlier recommendations and in cooperation with Assemblyman Thomas developed AB 2224 for introduction on April 28, 1975.

The bill was amended several times to accomodate some potential legal problems -- e.g. the original version did not contain a provision for any newcomers to the ranks of divers. After the bill suffered the usual delays for non-emergency legislation, it emerged from the legislature a little over one year after introduction. In the final analysis, the bill did not attract even one negative vote in either house (Senate: 35-0, Assembly: 65-0), but it also did not contain the features which the commercial interests felt were the most obnoxious parts of the Burge Report, and the issue of opening the north coast for commercial activity was never a part of the Burge Report or the legislation. In short, everybody got something.

Several tentative conclusions may be offered. First, DFG made an active effort to solicit comments on its management plan. Second, both sport divers and commercial interests took the opportunity and made their positions known loudly and clearly. Third, the interaction between DFG and the affected parties made a difference in the resulting legislation. Finally, because at the time of legislative decision making -- in committees and on the floors of both houses -- there was no opposition to DFG's modified proposal embodied in AB 2224, the bill drifted through without opposition.

Management Preferences and Politics

Having provided a brief case history of the enactment of AB 2224, we can now locate the resulting policies in the conceptual context outlined in Chapter 2, and relate them to the differing management preferences discussed in Chapter 3. This will help us gauge the relative political influence of the most directly affected groups in an effort to provide as accurate as possible a characterization of the political setting in which abalone management policies are determined. The present chapter will conclude with a discussion of some alternative management approaches.

In Chapter 2 we identified three distinguishable approaches to abalone management: limiting entry to the fishery, controlling access to the resource, and augmenting the resource. Prior to the adoption of AB 2224, the state had relied exclusively upon measures that controlled access -- size limits, restricted seasons and hours, gear restrictions, area closures, and quotas (bag limits) on the daily catch of individual sport divers. Responding to the Fish and Game Commission's request for a study of abalone management options, the Burge Report recommended an integrated program incorporating a combination of the three approaches we have identified: 1) limiting entry by specifying conditions that must be satisfied to renew or obtain a commercial diving permit; 2) imposing further controls on access by reducing the season for both commercial and sport diving and by establishing quotas on aggregate commercial landings as well as reducing the bag limits on the catch of individual sport divers; 3) augmenting the resource by intensifying efforts at abalone mariculture projects. The legislation that was ultimately enacted for management of the commercial sector adopted a modification of the first approach, omitted any changes in the second approach (with the

important exception of closing L.A. and Orange Counties for commercial divers), and made no tangible commitment to the third (although closing of L.A. and Orange Counties was viewed as a prerequisite to rehabilitating abalone stocks).

Management Preferences: Patterns of Agreement and Disagreement

Resource users. A comparison of abalone management preferences among the groups who are most directly affected reveals four distinguishable patterns:

1) universal support for limiting entry to the commercial fishery.

2) universal support for efforts to augment the resource, and willingness to pay additional fees that are earmarked for that purpose. This characterization excludes environmental groups, for whom this management option would not appear to be salient unless the manner in which it was implemented posed a threat to the well-being of the sea otter or its habitat.

3) a mixed picture of support and opposition with respect to controlling access. Apart from the proposal that sport divers be prohibited from "shopping" for larger specimens after they had reached the bag limit of legal abalones, none of the recommendations contained in the Burge Report was supported by all of the most directly affected interests (commercial, sport and environmental). The CAA and a majority of the individual divers and processors comprising our sample opposed all other proposals to further control access, including those associated with resource augmentation (i.e., bottom land leases for the mariculture of indigenous species), and even those that applied only to sport divers. The latter generally favored such proposals where they were directed at commercial divers and set no precedent that could be extended to sport divers (e.g., annual landing quotas as distinguished from a reduced and split season), but opposed them or sought to reduce their severity where aimed exclusively at sport divers.

Looking beyond the frame of reference established by the Burge Report, there were two additional proposals for controlling access that attracted widespread support among those interviewed. First, there was strong sentiment in favor of stricter enforcement of existing regulations--a call sounded most forcefully by sport fishermen who regard illegal diving activities as among the principal problems confronting the abalone fishery. A smaller but substantial number of commercial divers share this feeling, and so do the Friends of the Sea Otter: "It is clear that a larger budget and increased warden force are badly needed for better protection of the otter, its habitat, and the marine biological resources it must share with man."³ Second, there was widespread support for the systematic rotation of open and closed fishable areas. Although this option was omitted from the formal recommendations of the CAA, it was the second most familiar proposal to our sample of commercial divers (following limited entry), and the one with which the greatest number agreed (81.8%). Rotation was also included in the commercial processors' proposals for future legislation, and recommended by sport fishermen in communications with the Director of DFG. Environmental groups have also expressed a favorable opinion on this management alternative, as long as it would not cause additional conflict with the sea otter.

4) a clearly defined and intensely contested disagreement between all abalone divers and environmental groups with respect to containment of the sea otter, and between commercial and sport divers with respect to opening the north coast to commercial diving. In both cases, the dispute extends beyond equity considerations to biological assumptions: does the sea otter consume enough abalones to significantly diminish their numbers, or does it indirectly enhance the resource by eating its competitors (sea urchins) and

improving the quality of its food source (kelp beds)? Are there sufficient numbers of accessible abalones north of Point Lobos to support a commercial fishery without decimating the stocks available to sport divers, will their quality consistently satisfy commercial standards, and are modern commercial diving techniques and gear capable of overcoming the obstacles posed by difficult weather conditions and a rugged bottom terrain? As the number and complexity of these questions indicate, there appears to be little prospect of moving toward a resolution of conflict on appropriate policy until there is a greater measure of agreement on factual assumptions.

Resource Managers. DFG scheduled three public hearings to afford interested parties an opportunity to comment on the recommendations presented in the Burge Report. Additional meetings were held with representatives of the commercial industry, several sport diving councils, and other interested organizations. The Department went into these encounters with an "all-or-nothing" policy package that implied a definitive analysis of the problems confronting the abalone fishery.⁴ It emerged from them with recommendations for a more experimental approach that concentrated on what DFG believed to be the single most urgent problem: a high loss of sublegal abalone brought about by excessive picking pressure. As a first cut at controlling this problem, the Department recommended to the Fish and Game Commission that the commercial fishing effort be reduced "to a level that is adequate to harvest stocks and minimize handling mortality," and that pressure on the sport fishery be eased by shortening the season north of Yankee Point to six months, reducing the daily bag limit throughout the state to the first four legal-size abalone picked, and prohibiting the possession of more than two daily bag limits on declared multi-day fishing trips.

With respect to the commercial fishery, the Department's recommendations were treated as a prerequisite to future decisions on instituting size limit changes, landing quotas, and shorter seasons. The recommendations for the sport fishery were regarded as even more provisional:

...without control on effort, management schemes based solely on size limits and seasons will eventually fail to adequately protect the resource and provide a satisfactory take...Nevertheless, we feel (these) regulations are necessary to protect the stocks for the present time with the idea that in the near future a management plan can be devised to control and distribute effort and take on an area-by-area basis, and also resolve allocation problems between sport and commercial fishermen.⁶

Not all of the groups that would be affected by changes in the management of the abalone fishery agreed with DFG's definition of the problem, but they uniformly supported the principal method now proposed for attacking it -- limited entry to the commercial fishery. Although the Department's corollary recommendations for controlling access to the sport fishery had encountered considerable opposition, it was neither as intense nor as concentrated as the objections of the commercial industry to a shorter season and annual landing quotas.

Management Preferences: Levels of Support and Opposition

The path of public policy formulation is smoothed by consensus; where such consensus is weak or impossible to achieve, public policy is influenced by the level of support or opposition, and by the skill with which those positions are expressed. In the remainder of this section we will attempt to compare degrees of support for or opposition to abalone management alternatives among the groups that would be most directly affected, to characterize the effectiveness with which those opinions were represented, and to appraise the extent to which they were reflected in the revised recommendations of the Department of Fish and Game.

Owing to differences in the manner in which opinions were determined and in the specific questions asked, it is impossible to make strict comparisons of the intensity of management preferences. Referring back to the patterns of agreement and disagreement that we have delineated, the most consistent and reliable data are afforded by the structured interviews of a random sample of commercial divers. Using their responses as a kind of benchmark, we will derive estimates for the other groups from the most nearly comparable sources that are available.

Limited Entry. A moratorium on issuing permits to new divers was unequivocally supported by the California Abalone Association, agreed to by 77.3% of the commercial divers included in our sample, and either enthusiastically or cautiously endorsed by 5 of the 6 processors we interviewed. A comparable level of support from sport divers can be inferred from their strong tendency to define the abalone problem in terms of "too many commercial divers," which ranked first among their open-ended responses and second among closed-end responses. While neither the Friends of the Sea Otter nor the Sierra Club actively participated in the policy process that resulted in adoption of AB 2224, both groups have indicated that they "actively support" any limitation of fishermen numbers. Given the breadth of support for a policy of limiting entry, the only source of potential disagreement was the manner in which such a policy would be implemented.

Resource augmentation. With the exception of environmental groups who expressed no opinion, the breadth and level of support for this management option equaled or exceeded the consensus for limited entry. The CAA had already sponsored a modest seeding program in Santa Barbara, and concurred "almost completely" with the DFG concerning its mariculture recommendations.

(The reservation related to the proposal of bottom land leases.) Seventy-five per cent of commercial and 72.5% of sport divers indicated their willingness to contribute additional fees for seeding purposes, and 5 out of 6 processors included abalone seeding among the future management proposals they would like to see implemented.

Controlled access. We have already noted a mixed pattern of support and opposition with respect to the various measures proposed by DFG for controlling access. Our present concern is with the breadth and intensity of those positions, and the consequent latitude for reconciling or moderating them. Looking first at the three proposals for the commercial fishery -- a shortened and split season, reduced size limits, and annual landing quotas -- it is clear that all segments of the industry are strongly opposed to a shorter season. The CAA views this as a last resort that could only be justified by the failure of every other alternative. The commercial divers oppose it to exactly the same degree that they favor limited entry (77.3%), and the largest commercial processor asserts that a split six-month season in itself is enough to kill this fishery in the market.

The industry is equally unanimous in its opposition to a categorical reduction in size limits on pink, white, and green abalones: the CAA challenged both the recommendation and the data from which they were derived; commercial divers located "legal size too large" at the bottom of a list of eleven suggested problems (only 6% regarded it as serious), and processors were dismayed by the prospect of losing a year or more of breeding potential in return for a temporary increase in the supply of legal-size abalones that would show an inferior ratio of usable meat to shell weight. It should be emphasized, however, that these objections were directed at the DFG's recom-

mendation of a blanket reduction in size limits for the three species; selective changes designed to take account of a poor supply of food or genetic mutations in specific beds were supported by some processors and by the Santa Barbara-based, CAA-sponsored California Abalone Seeding Association.

Controlling access through annual landing quotas was also opposed by all segments of the industry, but with the exception of processors -- all but one of whom were flatly against either individual or industry-wide quotas -- the preponderance of opinion was neither as extensive nor as unqualified as it was to the preceding measures. The CAA joined 63.7% of commercial divers in opposing industry-wide quotas under present circumstances, but the Association left the door open for reconsideration of that position if accurate production figures were available for each species, if -- after a sufficient interval to determine the effect of limited entry -- those figures indicated that quotas for selected species were justified, and if size limits were not reduced. The existing limit on an individual diver's daily catch of black abalones was also cited as an alternative approach that had been worked out in cooperation with DFG. Perhaps the most significant exception to the industry's general position on landing quotas is to be seen in the CAA's statement that "a quota system concerning the commercial harvest of the north coast deserves the consideration of the Department of Fish and Game in order to utilize a vast resource which is at the present primarily wasted."⁷

The Burge Report's recommendations for further controlling access to the sport fishery included a statewide prohibition against exchanging smaller for larger abalones once the bag limit had been reached, a reduced season -- to six months in the north and to seven months in the south, and in the north only, a bag limit reduction from five to four abalones. Since our firmest

aggregate data come from the structured interviews of commercial divers, and since the commercial divers do not perceive competition from sport divers to be a very serious problem, our assessment of the uniformity and strength of opinions regarding management alternatives for the sport fishery is somewhat narrower and more impressionistic. The industry's limited concern with the sport fishery may be explained in part by the concentration of the commercial fishery in the south and of the sport fishery in the north; the comparatively greater concern of sport divers with competition from commercial divers in turn may be explained by sport divers' widespread perception of illegal commercial activities in the north. To the extent that the industry does express opinions about the sport fishery, these do not appear to be marked by a high level of intensity.

The most systematic representation of industry attitudes toward regulation of the sport fishery is to be found in the California Abalone Association's review of the Burge Report. Apart from endorsing the proposal that all legal abalones that have been picked by sport divers must be retained, the CAA favored a quite different approach that combines inhibitions to entry -- through stamps, tags, and nominal skill requirements -- with alternative measures for controlling access: increased size limits for sport fishermen and more stringent gear requirements. The CAA opposed reductions in the season or bag limits, and favored uniform policies for sport divers throughout the state.

Drawing upon testimony at public hearings and communications with the Department of Fish and Game, attitudes toward the Burge Report recommendations for the sport fishery may be summarized as follows:

- 1) There was no opposition among either sport or commercial divers to the proposal that all legal abalones picked be retained;

2) The most uniform and intense concern of sport divers was directed at proposals to reduce the fishing season. Although a majority did not insist upon retention of a full 10-month season, there was no consensus on how many or which specific months should be retained;

3) Apparently reflecting the greater interest expressed by sport divers on the central and north coast, the second most common and serious concern centered upon proposals that would permit more generous season and bag limits in the south, and draw the line distinguishing the two regions as far south as Point Conception;

4) Apart from the inequity of establishing different bag limits in the north and south, there was a mixed reaction from sport divers to the proposal that bag limits in the north be reduced from five to four -- some were adamantly opposed, others indifferent, and still others prepared to accept an even lower limit of three.

Management Policy Recommendations: The Burge Report Reconsidered

In view of the preceding assessment, a comparison of the proposals contained in the original Burge Report with the recommendations that were ultimately forwarded by DFG to the Fish and Game Commission is illuminating. Such a comparison could also be misleading, however, if it led to the conclusion that the Department simply acquiesced to the objections of one or more of the most directly affected groups. It must be remembered that the Department of Fish and Game is itself one of those groups -- it is the agency responsible for administering the policy of the state with respect to the abalone fishery, and as is made clear by the expectations of commercial divers and by the strong preferences of sport divers and environmental groups for stricter enforcement, it is to the state that the fishery looks for a resolu-

tion of its problems. In formulating policy recommendations the Department must be mindful of their consequences for its relationship with other agencies (such as the Fish and Game Commission and the legislature), of its internal organization, and of its enforcement capabilities. Having determined the measures that in its judgment would be the most effective in furthering the DFG's mandate to protect and enhance the state's marine resources, it must make an estimate of the likelihood that they will be accepted by the Fish and Game Commission and the legislature, and weigh the Department's capacity to implement them.

Differences between the Department's draft (Burge) report and its final recommendations reflect all of the foregoing considerations: challenges to the validity of its biological assumptions contributed to a shift in emphasis from an integrated final solution to an incremental approach that singled out the most promising first steps; indications of the breadth and level of support for or opposition to specific alternatives afforded clues as to which of them were most likely to be adopted, and which would maximize voluntary compliance upon implementation; reflection on the more intensive management role and enforcement effort that would accompany certain of the proposals included in the Burge Report or advanced by the industry served to further narrow the range of realistic options. With specific reference to the major alternatives that we have examined:

Limited entry. Whatever objections there might be to DFG's assumptions about the significance of damage to sublegal abalones by bar-cutting, everyone agreed that there were too many divers going after too few abalones. Whether the principal problem was defined as biological, economic or social, limiting entry to the commercial fishery was widely regarded as an appropriate response.

A consensus in favor of this approach augured well for its adoption by the legislature, and the simplicity of the method proposed to implement it (a moratorium on new entrants) required no changes in DFG's organization or mission. Furthermore, by reducing the number of licensed divers that DFG would be required to monitor, it was thought that this procedure could actually facilitate enforcement.

Resource augmentation. Limited entry was expected to eliminate the less experienced divers, and thereby reduce premature mortality from bar cutting. It was also expected to improve the economic well-being of the commercial divers who remained, and -- to the extent that commercial and sport divers were in competition with one another -- to improve recreational opportunities. But in the long run there would not be much prospect of significantly expanding recreational opportunities or satisfying a growing commercial market without substantially increasing the supply. Hence the widespread support and willingness to pay for abalone seeding projects. However, some important contingencies are attached to this approach: 1) it remains to be demonstrated that large-scale seeding programs are feasible, and if so, on what basis -- with open access to all sport and commercial divers, on bottom lands leased to a limited number of commercial divers (a potential restriction that has already been opposed by the California Abalone Association and that may conflict with the state constitution's guarantee of the right to fish), or for the even more limited purpose of rehabilitating areas that have been almost totally depleted; 2) any substantial expansion of resource augmentation efforts depends upon legislative action to acquire and appropriately channel the funds that commercial and sport divers have indicated they are willing to contribute for that purpose, and upon the provision of administrative

mechanisms for translating those funds into a vigorous program.

Controlled access. It should come as no surprise that all of the Burge Report proposals for controlling access to the commercial fishery were omitted from DFG's final recommendations, for each of them failed to clear one or more of the hurdles we have identified: a reduced season was intensely opposed by all segments of the industry, who regarded it as the death knell for a commercial fishery. The breadth and strength of this feeling promise a serious conflict when the proposal reached the legislature, and DFG would have a difficult time justifying such a drastic step when the effects of limiting entry were still unknown. A reduced size limit was similarly opposed by the industry, which buttressed its position with a detailed criticism of the data and assumptions on which the proposal was based. Since the recommendation for establishing landing quotas was primarily designed to forestall a "bonanza" harvest of the species on which size limits were reduced, rejection of the first proposal would eliminate the rationale for the second. Moreover, the imprecision with which the various species are differentiated on landing tickets would have compounded the enforcement problems posed by the industry's resistance to quotas, all of which may have dissuaded DFG from pressing its case for these interrelated proposals unless limited entry proved to be incapable of protecting the resource.

The experience of proposals to further limit access to the sport fishery is distinguishable in two respects: first, the breadth and intensity of reactions to these proposals were much less uniform than in the case of recommendations for the commercial fishery; and secondly, anticipation of the legislature's reaction did not figure in the process, since the Fish and Game Commission has been delegated authority to regulate the sport fishery. Given

these differences, it is not surprising to find that where objections were encountered, the tendency was to modify rather than to simply withdraw the original proposals: The season was reduced to seven rather than six months in the north and unchanged in the south, while the line distinguishing the two regions was shifted northward from Point Conception to Yankee Point (near Monterey). A longer season in the south could be rationalized in terms of better weather conditions, and -- therefore -- less likelihood of bar-cutting sublegal abalones during winter dives. Different bag limits in the north and south might be rationalized on a weight basis, since the most frequently harvested species tend to be smaller in the south than in the north, but on this point the Department responded to claims of inequity from northern sport divers by recommending a uniform lower bag limit of four abalones throughout the state. The prohibition against shopping for larger abalones once the bag limit has been reached was unopposed, and unchanged.

Political Effectiveness

To this point, we have been concerned with responses to DFG proposals that evoked a consensus -- one way or the other -- among all affected groups, or that met a mixed reaction from the one group that was most directly affected. We turn now to two proposals that originated with the industry rather than DFG, and that have generated an intense conflict among affected interests: containment of the sea otter and opening the north coast to commercial diving.

While it would be an exaggeration to hold these two concerns exclusively responsible for the low esteem in which the DFG is held by commercial divers, they appear to have become focal points for the commercial diver's belief that DFG is unresponsive to his problems. This would appear to be at odds with the industry's recent experience. Since 1969, when the CAA first became

active, a majority of the proposals that it has advanced or endorsed have been adopted: the size limit was reduced on green abalones and increased on pinks; the twenty-foot law was suspended on some portions of the Channel Islands; the season was changed to close the months of February and August (rather than mid-January through mid-March); the prohibition on the drying, canning and export of California abalone was repealed; experiments to determine the feasibility of abalone seeding were undertaken, and although the industry-sponsored apprenticeship program was short-lived, it proved to be the precursor of proposals to directly limit entry. Furthermore, as we have just seen, virtually all of the objectionable features associated with limited entry -- a shorter season, reduced size limits, and landing quotas -- were dropped from DFG's final recommendations to the Fish and Game Commission and the state legislature.

Despite the preceding record, the perceptions of many commercial divers are represented in the comment of one that "it doesn't seem like anything we say is passed, or if it is it's so greatly modified that it's not what we want anyway."⁸ The apparent discrepancy between experience and perceptions could be a result of ignorance or forgetfulness of what has been accomplished, or a measure of the divers' frustration by at least two objectives that remain unfulfilled -- containing sea otters and opening the north coast.

Containing the sea otter. The sea otter controversy dates back to the early 1960's, when-- the industry contends -- it took nearly five years to convince the Department that the otter posed a threat to abalone stocks. Once persuaded of the threat, DFG was caught in a crossfire of opposing positions, with commercial and sport divers seeking containment of the otter, and the Friends of the Sea Otter and Sierra Club striving to protect their freedom

to roam and propagate throughout their natural range.

In 1972 state jurisdiction over the sea otter was preempted by the Federal Marine Mammal Protection Act. In subsequent years, DFG considered the creation of a sea otter refuge on San Nicholas Island. This option was originally supported but later discounted by the Friends of the Sea Otter, consistently rejected by commercial abalone fishermen, and ultimately dropped by DFG upon its identification of some harmful side effects. More recently, DFG requested that the Secretary of the Interior restore the state's authority to manage the southern sea otter. This request was vigorously opposed by the Friends of the Sea Otter, and as the likelihood increased that they would succeed in their effort to have the sea otter declared an endangered species, the Department withdrew its original request for full management authority in favor of a scientific research permit to determine the potential "relocatability" of the sea otter. While the Friends have endorsed a "pilot experiment to capture not more than 30 otters for translocation to the northern end of their present range," they have not conceded any justification for limiting the sea otter's range.

In pursuing their vision of the public interest, the Friends of the Sea Otter enjoy the advantages of a larger and more diversely composed membership, a sharpness of focus that enables them to concentrate on a single objective, and perhaps most importantly, a capacity to take advantage of a shift in the policy-making arena from Sacramento to Washington D.C., where they can capitalize on a national clientele and the sympathy of organizations like the Sierra Club. Having at last secured DFG's support of its efforts to contain the sea otter, the abalone industry finds itself little closer to achieving that objective, and not all of its members may appreciate the constraints

within which DFG must operate.

Opening the north coast. The political problem posed by the closure of the north coast is rather different from that posed by the sea otter. Experience with other proposals sponsored by the abalone industry indicates that DFG support is a necessary -- if not always sufficient -- condition of adoption, and DFG remains to be convinced of the advisability of opening the north coast to commercial diving. In 1951 the Department undertook a special study of the capacity of the north coast to support a commercial fishery. At that time it specified several requirements that needed to be satisfied before the question of competition with the sport fishery could even be entertained:

There must be sufficient abalones in the area and these must meet required size and quality standards. Adequate and safe shelter must be available for the diving boats, the fishing area must be accessible to the fleet and the weather must be calm enough to permit diving sufficiently often to make the operation profitable. Water clarity (underwater visibility) and bottom terrain, while not as critical, must also be considered.⁹

Upon completion of its study in the mid-1950's, the Department concluded that "none of the north coast areas investigated met any of the criteria," and that the question of impact on the sport fishery was therefore academic. But circumstances have changed in two decades -- quality standards are not as high as they were when red abalones were still fairly plentiful, the Radon boat has somewhat reduced dependence upon stable weather conditions and nearby harbors, and dwindling stocks in the south have already forced divers to explore difficult bottom terrain. DFG is not unmindful of these changes, but even assuming (and it remains a big assumption) that the earlier criteria could not be satisfied, the question of competition with sport divers would no longer be academic, and the potential mobilization of thousands of sport

divers throughout legislative districts along the north coast cannot help but make DFG officials question the political feasibility of opening the north coast to commercial diving. Finally, uncertainty regarding the biological, commercial and political feasibility of this step would almost certainly dictate an experimental approach requiring an intensive managerial role to be played by DFG, and historically that agency has been more oriented toward protecting marine resources than toward systematically managing them for purposes of enhancing commercial benefits.

In sum, if the abalone industry is to succeed in its effort to open even carefully delimited areas of the north coast on an experimental basis, it must first enlist the support of an agency that has many reasons to be skeptical of such an effort, and then overcome predictable resistance from sport divers once the proposal reaches the legislature. (It will be recalled that 88% of the leadership of sport diving associations indicated their opposition to opening the area north of Point Lobos to commercial diving.) Perhaps the one thing that the industry has going for it, as far as the sport divers are concerned, is the prospect that close monitoring of legitimate commercial diving might limit the black-market activities that sport divers allege to be so extensive in the north.

Administrative Considerations

Beyond its historic orientation toward research and its statutory responsibility for protecting marine resources, DFG's response to abalone management proposals is influenced by manpower limitations and prospective enforcement problems.

Personnel

Apart from a small appropriation from the general fund that is earmarked

for non-game animals, the Department's revenues are derived from the sale of licenses, stamps, tags, and permits; from fines levied for violations of fish and game regulations, and from taxes imposed on the commercial catch. The bulk of its funds comes from sportsmen, and are designated for the protection and enhancement of sport fishing (and hunting).

Any change in management responsibilities that would require additional staff will also entail additional funds to employ them, and the source of those funds is not self-evident. Sport fishermen are not likely to favor the use of their license fees for the benefit of the commercial divers whom they view as competitors, and while industry members may be prepared to pay additional fees to support activities which they approve -- such as abalone seeding projects -- the closer supervision that accompanies more intensive management will not always be welcome. There remains the possibility of tapping the general fund, but that would substantially broaden the base of affected interests, and thereby increase the sources of potential opposition to any given management proposal.

Enforcement

To the extent that any management option involves closer supervision, it will require the diversion of existing staff or the provision of additional staff. However, some proposals may be intrinsically more difficult to enforce than others. Of the several management proposals that we have canvassed, the one that received most extensive support among commercial divers was the rotation of open and closed fishable areas. Because that approach may also be among the most difficult to enforce, it can be used as an example of the administrative consequences of a management plan.

The objective of area rotation is to afford selected abalone beds total relief from picking pressure, thus promoting spawning and recruitment while reducing the picking, replacement and frequent bar-cutting of sublegal abalones. But some enforcement personnel doubt that these assumptions would prove to be valid beyond the first closure, as they foresee redoubled pressure on the closed area once it is reopened. Area rotation would therefore require some limits on what could be taken from open areas to prevent serious overharvesting.

The feasibility of enforcing an area rotation program depends upon the degree of refinement sought. If the areas to be rotated are as vast as the entire north and south coasts (as one processor has suggested), then the provision of a substantial buffer zone between the two regions could make enforcement relatively easy. If, on the other hand, the areas were as precisely delimited as two nearly adjacent beds, enforcement could be extremely difficult: in the absence of natural boundaries it would be hard to distinguish closed from open areas, and even if this problem could be overcome, divers ostensibly fishing for urchins in areas closed for abalone could remove them to open areas, where they could be retrieved by a friend or by the same diver on the following day. And if, as many processors have suggested, area rotation is associated with opening selected portions of the north coast, with quotas to be established for specific beds, the problem of keeping divers within designated areas would be compounded by the need to monitor their take, and perhaps to limit the number of divers permitted to fish these areas.

DFG's awareness of the administrative problems that might accompany area rotation may help to explain that agency's apparent unresponsiveness to a proposal that is strongly supported by commercial divers, that has been sup-

ported in the past by environmental groups, and that in principal would not seem to be objectionable to sport divers. However, it should be noted that the industry has made little organized effort to press for adoption of this proposal -- it was not included in the CAA's formal response to the Burge Report, though the omission was reportedly an oversight -- and DFG could not be fairly characterized as flatly opposing the idea. Indeed, as noted earlier in this chapter, its recommendations for the abalone sport fishery anticipated a future management plan that would "control and distribute effort and take on an area-by-area basis, and also resolve allocation problems between sport and commercial fishermen."¹⁰ Despite the problems that we have identified, enforcement of such a plan could be eased by the prior implementation of limited entry, which is expected to screen out the part-time commercial divers who have the least concern with preserving the resource, and the least incentive to police themselves.

Conclusion

In concluding this chapter it may be useful to identify three conditions that must be satisfied before policy preferences can be translated into governmental action. First, the policy-making process must be activated -- no matter how extensive the support for a given policy option, it will have no effect until a specific proposal is placed on the agenda of appropriate public agencies. Secondly (at least in democratic governments), it is necessary to demonstrate a consensus in favor of the proposal, or to reach a compromise that leaves no influential groups strongly opposed to it, or to balance a policy that is opposed by a particular group with a policy that it supports. Finally, funds, personnel, and organizational structures must be provided to effectively implement proposals that have cleared the first two hurdles.

Tracing the progress of recent abalone management proposals through this obstacle course, we find that limited entry stands at the point of implementation; and as the program is presently formulated, implementation requires no additional funds or personnel. Proposals for augmenting the resource through seeding projects have received universal support but await the funding, personnel, and organizational arrangements required for full-scale implementation. Proposals for further controlling access, on the other hand, have experienced mixed success; certain recommendations for the sport fishery have already been implemented. Other proposals, such as containment of the sea otter and opening of the north coast to commercial divers, have not yet resolved the sharp disagreements among contending interests that forestall implementation. Still other proposals, such as area rotation, have yet to be clearly placed on the policy-making agenda.

Recent experience with proposals to further control access to the resource appears to be most suggestive of the political and administrative context in which future abalone management options will be addressed. It is a context in which it is unlikely that consensus on procedure can overcome differences in objectives, as was the case with limited entry, and that will therefore require some hard choices as to which definitions of the abalone problem should receive priority. The nature and implications of these choices will be discussed in the final chapter.

Footnotes to Chapter 4

- 1 A companion bill(AB 2880) was introduced after AB 2224 had moved part way through the legislative process in order to 1) make minor technical changes in the language of AB 2224 2) close the coast to all taking from Palos Verde Point (Los Angeles County) to Dana Point (Orange County) for a five-year period, and 3) establish new regulations dealing with the taking and possession of black abalones near and around some of the Channel Islands.
- 2 California Abalone Association, "Review of the Abalone Research Report Prepared by Operations Research Branch and Marine Resources Region of the State of California Department of Fish and Game of 17 January 1975: Comments and Recommendations of the California Commercial Abalone Fishery;" undated, mimeo.
- 3 Letter from Friends of the Sea Otter to Charles Fullerton, Director, California Department of Fish and Game, January 7, 1976, p. 11.
- 4 "These measures are presented as an integrated program and their effectiveness requires that the concepts of the entire program be adopted and not be accepted or rejected on an individual basis." (Burge, et al., p. 5).
- 5 Richard T. Burge, "Abalone Management Report," presented to the California Fish and Game Commission on October 3, 1975; mimeo, p. 4.
- 6 Ibid., p. 5.
- 7 California Abalone Association, "Review of the Abalone Research Report...", op. cit., p. 18.
- 8 When commercial divers were asked to indicate whether they felt they were able to influence state government, 31% of the sample said they could, 31% said it depended on the situation, and the remaining 38% said they could not influence state government. And yet most commercial divers in the sample (70.5%) had attended one or more meetings devoted to discussions of problems in the abalone industry. Many divers try to influence policy, but there is not a widespread feeling of high efficacy.
- 9 Keith W. Cox, "California Abalones, Family Haliotidae," Fish Bulletin No. 118, (California Department of Fish and Game, 1962), p. 103.
- 10 Burge, "Abalone Management Report," op. cit., p. 5.

Chapter 5

SUMMARY AND CONCLUSIONSIntroduction

The first part of this final chapter is devoted to a summary of the ideas developed and presented in preceding chapters. This will be a short summary and does not pretend to capture the nuances of the previous material. By way of concluding remarks, this chapter tries to articulate some of the major issues that arise from the analysis of abalone resource management, the important policy choices that have been made and some trade-offs about which decisions must be made in the near future. Some specific policy actions are then suggested.

Summary

The world's fishery resources are not limitless and the growing recognition of this elementary fact has been the impetus behind a new surge in this country and elsewhere toward a more active governmental management of fishery resources. A management technique known as limited entry has attracted worldwide attention and actual implementation during the last few years. Essentially, limited entry refers to any one of several ways in which government controls the number of fishermen who are legally eligible to take a fish species (usually for commercial purposes). Experience with limited entry programs is too recent for a thorough evaluation of the consequences. What is disturbing is that very few limited entry programs have been or are collecting data that will allow measurement of program consequences. It is clear, however, that every limited entry program should be designed to fit the specific needs and conditions of each particular situation

-- blanket, universal rules will not work in all cases. Furthermore, limited entry programs in any one fishery may have impact on other fisheries and these consequences must be carefully considered. There are, in addition, some serious problems of administration that must be addressed in order to assure the equitable and efficient implementation of a limited entry program.

Probably the single most important generalization to be made about the abalone resource, and especially its commercial use, is that this decade has seen a drastic decline in its availability. Total commercial landings, and by all accounts individual recreational landings, have fallen off considerably. Among the more prominent reasons for the decline are the exhaustion of accumulated (virgin) stocks, the frequent picking of immediate sublegal size abalone and the resulting high mortality rate from bar-cutting, sea otter foraging, and the large number of divers who have been attracted to the commercial fishery in recent years. The combined impact of these forces has resulted in a serious decrease in the abalone harvest. Indeed, many formerly rich ocean beds are now barren.

It became apparent to many that some action was required if the resource were to be preserved in the area between Point Lobos and the Mexican border. Those engaged in the policy-making process had three basic management plans to consider: limited entry, limited access, and resource augmentation. While there is no reason why each of these basic types must be implemented separately, the interaction of the species' biological requirements with political and administrative constraints and realities dictated an abalone policy approach that leaned heavily upon limited entry for the commercial fishery.

The development of any abalone management plan, and especially its